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AN ANALYSIS OF AIR FORCE MANAGEMENT
CAREER DEVELOPMENT BASED ON TIMING OF
SKILLS NEEDS AND EFFECTIVENESS
OF DEVELOPMENT METHODS

THESIS

Sebastiano DeLiso, Captain, USAF

AFIT/GSM/LSQ/91S-8

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AN ANALYSIS OF AIR FORCE MANAGEMENT CAREER
DEVELOPMENT BASED ON TIMING OF SKILLS NEEDS AND
EFFECTIVENESS OF DEVELOPMENT METHODS

THESIS

Presented to the Faculty of the School of Systems and
Logistics of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Systems Management

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September 1991

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Preface

The purpose of this study was to analyze the association between the perceived importance of management skills and management level; also to assess the most effective means of developing each of those management skills. I first conducted a literature search and compiled a list of common management skills and development methods. Armed with this knowledge, I then distributed a survey to the many "experts" (managers) in the USAF. Their greatly appreciated efforts made this study possible.

The results indicate a high degree of association between perceived skills importance and management level. Although less conclusive, experience is the overwhelmingly preferred development method. This information, and continued study (especially of development methods) will greatly contribute to AF manager career development.

I could not have completed this research without the help of several individuals. I sincerely thank my thesis advisor, Dr. Michael Heberling for helping me "take that hill," and my reader, Dr. Richard Murphy for pushing me ever towards perfection. I thank Mr. Teddy Houston, SAF/AQZ, for his sponsorship and support when needed. A special thanks to Professor Dan Reynolds for his expert statistical advice and undying enthusiasm. Finally, of course, I thank my wife Cathy for her many "sleepless" nights whilst I toiled endlessly (seemingly at least) towards graduation.

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Abstract

✓ The purpose of this study was to analyze the association between the perceived importance of management skills and management level; also to assess the most effective means of developing each of those management skills. Data collection involved a two step process. First, a literature search was conducted to compile a list of common management skills and development methods. Second, from this knowledge a survey instrument (requesting respondents to: rank skill importance, select preferred development methods, and provide qualitative comments)-was created and distributed. Data analysis included three basic methodologies: 1) non-parametric statistics, 2) frequency distribution analysis, and 3) qualitative analysis. The results indicate a high degree of association between perceived skills importance and management level (11 of 14 skills were significantly (statistically) associated). Further, 13 of the 14 skills had a consensus of preferred development methods (with experience as the predominant choice). The topic of development methods requires further research. The evidence suggests that the Acquisition Professional Development Program is basically sound and could be improved with only minor changes. ✓

AN ANALYSIS OF AIR FORCE MANAGEMENT CAREER
DEVELOPMENT BASED ON TIMING OF SKILLS NEEDS AND
EFFECTIVENESS OF DEVELOPMENT METHODS

I. Introduction

Background

The acquisition workforce has been under intense public scrutiny over the last several years. An excerpt from Appendix K of the 1986 President's Blue Ribbon Commission of Defense Management highlights this fact.

The business judgements, qualifications, ethics, and motivations of today's defense acquisition personnel are major topics of debate for the press, Congress, and top level of the Executive branch and military hierarchy (Market Opinion Research, 1986:165).

The findings of the 1986 study resulted in (among other reforms) the establishment of a structured career development path for Air Force executive managers. This career path established mandatory minimum certification requirements in the areas of education, training, and experience. A more recent development, the passage of "The Defense Acquisition Workforce Improvement Act" (commonly known as the "Mavroulles Bill"), goes even further. This Act establishes minimum requirements for all acquisition disciplines (not just program management) at all responsibility levels (not just executives). The intent is to establish and improve the quality of the overall

acquisition corps. The immediate result to Air Force officer personnel has been the recent publication of Air Force Regulation (AFR) 36-27, Acquisition Profession Development Program (APDP), dated 26 Dec 90. The APDP establishes minimum requirements for certification levels for all acquisition disciplines. Chapter 11 of AFR 36-27 more specifically describes the Program Management Professional Development (PMPD), which is the focus of this study.

Definitions

To ensure a common understanding of the terms described in the subsequent paragraphs, several definitions are provided. The Air Force has management levels which are comparable to commercial management levels. Junior Managers, Middle Managers, and Executives in the commercial world are analogous to "Acquisition Project Officer," "Acquisition Management Officer," and "Program Director" in the Air Force. These three management levels are grouped below. The group numbers and titles defined below shall be used interchangeably throughout this document. These definitions are summarized from AFR 36-1, Officer Classification, dated 15 Sep 90.

Group 1: Acquisition Project Officer: Air Force Specialty Code (AFSC) 2721/2724 - Responsible for assisting in the planning and management of system, subsystem or equipment acquisition programs. Ranks: 2Lt through Major. Note that the AFSC 2721 designates entry level personnel.

Group 2: Acquisition Management Officer: AFSC 2711/2716 - Responsible for system, subsystem or equipment, or overall aspects of the program management effort. Rank: - Major through Colonel. Note that AFSC 2711 designates entry level personnel.

Group 3: Program Director: AFSC 0029 - Responsible for executive supervision in acquisition program management. Rank: - LtCol through Colonel.

For the purposes of this study, the terms "manager", "program manager", "project manager", "project officer", and "acquisition manager" are assumed equivalent and shall be used interchangeably throughout this document.

Statement of the Problem

The development of various management skills at the appropriate program manager's career phase is key to the acquisition corps' mission. The Air Force PMPD certification requirements specifically apply to the three management groups defined above. These certification requirements provide a framework for a program management career path. This career path is the key to the development of the Air Force manager.

The importance of project management training becomes particularly clear when you look at the typical career path of a project manager (Thornberry 1987:60).

Which skills are needed at each management level is not specifically known. Further, at what time in the manager's career should each development method, or combination of methods, be provided to most effectively develop the skills needed has not been substantiated.

A study of the common skills needed by managers, which skills are most needed at each management level, the common development methods available to managers, and the effectiveness of these development methods may provide information needed to better equip Air Force managers.

Justification of Research Effort

The need for management skills has been well documented (see Chapter 2: Review of the Literature), all of which agree that management skills are key to management success. The specific skills which are needed is also well documented, but with less agreement as to which are the most important skills. There is still less agreement as to the methods for developing these skills and which are the most effective. Finally, the skills required by program managers is by no means static.

However, experience shows that the relative importance of these skills varies with the management level you are on and the type of responsibility you have (Badawy, 1982:20).

It is not feasible to develop all the skills needed for all the management levels all at once. Thus, timing the development of the skills required at the appropriate management levels would result in an "ideal" career path. For the purposes of this study, Ideal Career Path shall be defined as follows: The career path that provides the development method(s) best suited to develop the management skills needed when they are needed.

Research Objectives

The ultimate goal of this research is to develop an "ideal" career path (as defined above) for Air Force managers. This ultimate goal can be more distinctly segregated into four research objectives:

1) Compile a list of common skills used by managers, 2) Determine the relation between skill importance and management level, 3) Compile a list of development methods available to Air Force managers, and 4) Determine the development method(s) most effective in developing each skill. Research Objectives 1 and 3 do not require hypotheses. Research Objectives 2 and 4 do require hypotheses but cannot be stated until Research Objectives 1 and 3 are met. The literature review in Chapter 2 shall be used to meet Research Objectives 1 and 3; thus the hypotheses for Research Objectives 2 and 4 shall be stated at the end of Chapter 2.

Scope and Limitations

This study is limited to the PMPD portion (Chapter 11) of AFR 36-27, APDP, dated 26 December 1990. The other acquisition disciplines not included in this study are: acquisition logistics, communications-computers, comptroller, contracting, developmental engineering, manufacturing and quality assurance, science and technical, and test and evaluation. This regulation only addresses Air Force Officers (up to the rank of Colonel); other Department

Of Defense managers and Air Force civilian managers are excluded from this study. This study will focus on the career development of nonrated Air Force Officers, however, many of the findings will be applicable to rated Officer career development as well. The development methods will be limited to the ones described in AFR 36-27 and are specifically defined in Chapter 2: Review of the Literature.

II. Review of the Literature

Introduction

The complexity of management requires managers to possess a breadth of skills. Consequentially, effective career development is vital to competent management.

Managing is not a narrow vocation. It is neither science nor profession. It calls on all the best resources of colleges and universities as one of the most dynamic, intricate and necessary of human arts (Dill, 1989:57).

The purpose of this chapter is threefold: 1) Meet Research Objectives 1 and 3 by reviewing literature describing common management skills and development methods available to Air Force managers, 2) Review additional literature describing career-development philosophies and previous Air Force findings to facilitate test instrument design, and 3) Using both, state the hypotheses for Research Objectives 2 and 4.

Management Skills

This section will focus on the skills commonly required by managers.

There is no single magic formula for successful program management. However, based on years of experience it becomes apparent that program managers must possess specific skills (Thamhain and Wilemon, 1978:100).

The assumption that the most skills are learnable and not unique to certain individuals or personal attributes is documented:

However, all categories taken together, 94% of project management skills seem to be learnable. The real significance to management is that skills don't just happen by chance or are the attribute of especially gifted people, but they can be developed systematically (Thamhain, 1989:654).

The literature reviewed identifies 3 major categories of management skills: technical, administrative, and interpersonal (Thamhain, 1989:653). As stated in Chapter 1, the skills required change as managers progress. This is the driver for the need for effective timing of skills development. A graphical representation of the three major skills categories as a function of management level is provided in Figure 1.

There is an extensive amount of literature describing the topic of management skills in commercial industry. The skills described are common to all managers. Not all the sources described the same listing of needed skills, nor did the sources define the skills the same way. For the purpose of this study, all of the sourced skills have been grouped (and defined) into 14 distinct skills. Any author that indicated the need for the skill, or was used to define that skill is sourced. A list of the 14 common management skills is provided (alphabetically) below. This author's definition and applicable sources are included for each skill.

Controlling - The ability to pro-actively assure maintenance of and adjustment to the project resources, plans, schedule, and budget, in the continuous evaluation of the achievement of project goals (Badawy, 1982:8-9; Schlick 1988:22; Stuckenbruck, 1976:43).

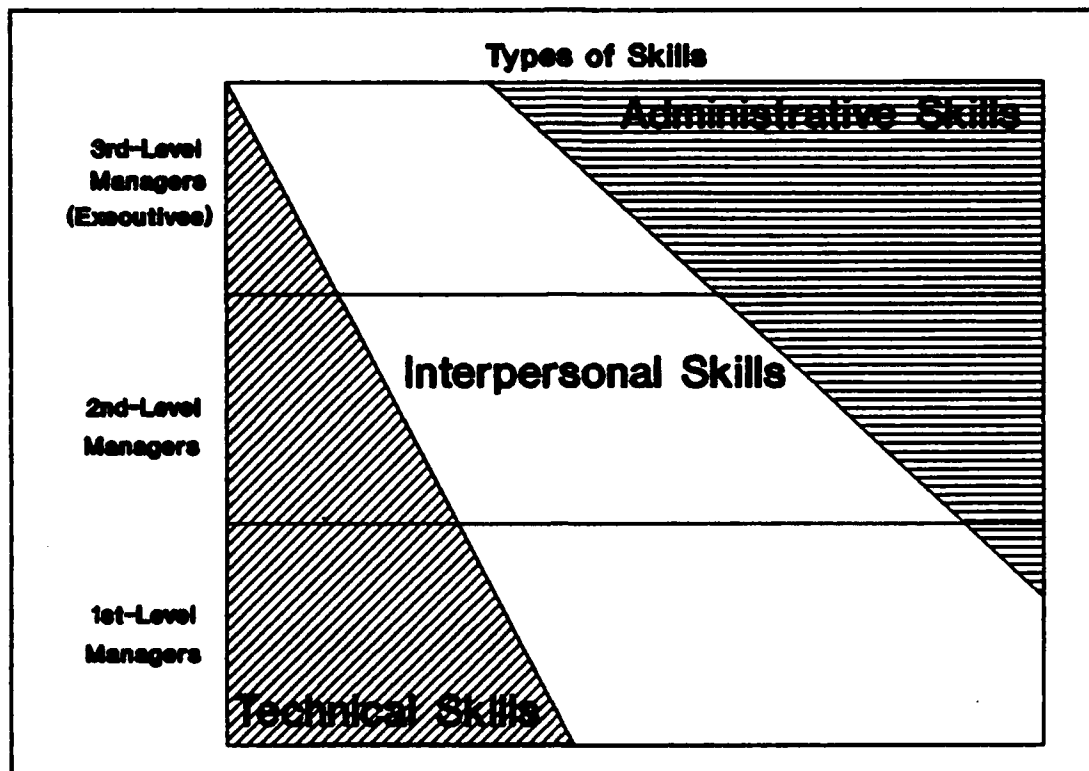


Figure 1 - Management Skills Mix (Badawy, 1982:21)

Decision Making - The ability to define, evaluate, and select (or recommend) alternatives weighing all pertinent project priorities (Badawy, 1982:18; Mintzberg, 1989:322; Thamhain, 1989:652).

Information Processing - The ability to read and/or listen to data and then discern relevant information (Badawy, 1982:18; Mintzberg, 1989:322).

Leadership - The ability to provide direction, vision, goals, and inspiration to the group (Archibald, 1976:54; Badawy, 1982:9; Posner, 1986:53-54; Stanely, 1988:17; Thamhain, 1989:654; Thamhain and Wilemon, 1978:101).

Motivation - The ability to provide incentives and an environment conducive to getting the most out of each individual on the project team (Badawy, 1982:9; Mintzberg, 1989:322; Stuckenbruck, 1976:41; Thamhain, 1989:652).

Oral Communication - The ability to converse with, brief, and listen to supervisors, subordinates, and peers (Archibald, 1976:54; Badawy, 1982:9; Beth and Goel,

1990:583; Posner, 1986:54; Schlick, 1988:22; Stuckenbruck, 1976:44; Thamhain, 1989:652).

Organizational Politics - The ability to "understand how the organization works and how to work with the organization" (Thamhain and Wilemon, 1978:103). Includes both internal and external diplomacy needed to compete for and secure additional resources (Badawy, 1982:10; Thamhain, 1989:654; Thornberry, 1987:61-62).

Planning - The ability to create and revise the project strategy defining what, who, when, and how the project goals will be accomplished. Includes project schedules and budget programming (Badawy, 1982:8; Beth and Goel, 1990:583; Schlick, 1988:22; Stuckenbruck, 1976:43; Thamhain and Wilemon, 1978:102-103).

Project Organization - The ability to divide the overall project into component tasks and structure them to achieve project goals. Includes the ability to arrange key events like meetings or reviews (Badawy, 1982:8; Posner, 1986:53-54).

Resource Allocation - The ability to implement trade-off decisions and assign the existing resources accordingly (Mintzberg, 1989:322; Schlick, 1988:22; Thamhain and Wilemon, 1978:102-103).

Stress/Conflict Management - The ability to anticipate, react to, and introduce, conflict to further project goals (Badawy, 1982:8; Mintzberg, 1989:322; Posner, 1987:210; Thamhain, 1989:652,654; Thamhain and Wilemon, 1978:102).

Team-Building - The ability to identify, acquire, and integrate functional members into a single project team (Posner, 1986:53-54; Schlick, 1988:22; Thamhain, 1989:652; Thamhain and Wilemon, 1978:101; Thornberry, 1987:60).

Technical - The ability to understand, converse in, evaluate, and balance the technical concepts, applications, and trends of the project (Badawy, 1982:18; Posner, 1986:53-54; Stanely, 1988:17; Stuckenbruck, 1976:46; Thamhain, 1989:654; Thamhain and Wilemon, 1978:102).

Written Communication - The ability to create, revise, and review documents to/from supervisors, subordinates, and peers (Archibald, 1976:54; Badawy, 1982:9; Beth and Goel, 1990:583; Posner, 1986:53-54; Schlick, 1988:22; Thamhain, 1989:652-654).

Skills Development Methods

Knowing which skills are needed at each stage of a manager's career is only a part of the problem; how to best develop each skill is another dilemma. "The problem is not just one of identifying the skills but also how to teach them" (Heimovics and Herman, 1989:299).

AFR 36-27, Acquisition Professional Development Program (APDP), Chapter 11, Program Management Professional Development (PMPD), lists the development methods available to Air Force Officers. The PMPD uses a table (11-1) to indicate the development methods to be completed for each of its three certification levels (I, II, and III). The development methods are grouped into three major categories: 1) Education, 2) Assignments and Experience, and 3) Training. The requirements of a fourth category, Professional Military Education (PME) are defined earlier in the regulation (Chapter 2). For the purpose of this study, all of the development methods described or implied by AFR 36-27 have been grouped (and defined) into 14 distinct development methods. The 14 development methods available to Air Force Officers are defined below (AFR 36-27, 1990:35).

Project Officer (PO)/Program Manager (PM) Experience - an assignment where a person is responsible for cost, schedule, performance, reliability, and maintainability of a system or sub-system being developed, modified, or produced by a program office or similar organization.

Observational Experience - an assignment where a person works for or in support of a PO/PM in a functional role

(such as engineering, configuration, logistics, contracting, program control, etc.).

General Acquisition Experience - assignments in support of acquisition but not in a program office (such as a test organization, laboratory, Contract Administrative Services organization, etc.).

Operational Experience - any assignment that gives the incumbent a first hand experience of operational user mission functions (includes aircrew, missile launch officers, maintenance, munitions, etc.).

Headquarters Experience - any acquisition-related assignment at a Headquarters (HQ).

General Training - Seminars, Workshops, Symposiums, or Instructional Briefings.

Short Courses - courses lasting less than 1 month intended to teach specific skills (such as SYS 100, 200, 400 or Professional Continuing Education (PCE) specialty courses).

Long Courses - courses longer than 1 month intended to develop broad skills and concepts (such as Defense Systems Management College (DSMC) Program Management Course (PMC) or single courses taken at a university not in pursuit of a degree).

Technical Bachelor's Degree - accredited bachelor's degree in science, engineering, or computers.

Non-Technical Bachelor's Degree - accredited bachelor's degree in disciplines other than science, engineering, or computers.

Graduate Degree - accredited Master's or Doctorate degree in any area.

Squadron Officer's School (SOS) - any method (residence, correspondence, etc).

Intermediate Service School (ISS) - or equivalent, any method.

Senior Service School (SSS) - or equivalent, any method.

Career Development

The combination of perceiving which skills are required when and perceiving which development methods are most

effective in developing those skills will provide the ingredients needed to develop an "ideal" career path; the goal of this study.

Properly employed career development..., plus a more precise understanding of the skills of the effective manager, will give us a much higher rate of return on human resource investments in manager development than we have gotten in the past (Pearse, 1974:3).

Due to the broad nature of the daily activities encountered by each manager, too specific of a career plan would be ineffective.

... neither you nor I knows what the big issues will be when today's students are at the height of their careers... We have to give them a breadth of education that will prepare them, not for the problems we know today, but for the problems that we don't know today (Johnson et al, 1986:19).

The general nature of skills-needs based upon management level, however, suggests the general timing of the various development methods would result in more effective career development.

... managers contend that the training must be timed pretty specifically in order to have any significant affect on them (Zemke, 1985:50).

A significant number of sources emphasize that of the three major development methods categories (experience, training, and education), experience is the critical one (Archibald, 1976:56; Beth and Goel, 1990:583; Johnson, 1986:146; Schlick, 1988:24-25; Stuckenbruck, 1976:47; Thornberry, 1987:61). Thus, career development must be

structured to accommodate the "need" for experience and breadth of experience.

The future project manager, therefore, usually has had to learn his skills by experience. For this reason it is extremely important that the project office provide an effective training ground for these future project managers (Stuckenbruck, 1976:47).

The overwhelming agreement that experience is the best teacher might lead one to discard (or seriously curtail) the other development methods. This would prove ineffective for two reasons. First, development by experience can be costly to the organization.

Actually doing the job is perhaps the fastest way to understand a job, but understanding the job doesn't necessarily translate into ability to do the job. With million-dollar projects OJT can be a high risk strategy (Thornberry, 1987:61).

Second, experience by itself can be very limited; combined with other development methods it can provide more cultivated lessons.

The skills required by project managers can only be developed through actual experience on projects. However, this development can be accelerated, and the effectiveness of the managers increased, through appropriate development and training... (Archibald, 1976:56).

Finally, some of the literature proposed the theory that a technical undergraduate and management graduate degree provided the best educational combination for effective program management (Lopez, 1987:7; Solberg and Steiner, 1972:29; Stuckenbruck, 1976:46; Thamhain and Wilemon, 1978:102).

There was, however, little empirical research to substantiate this theory. Air Force references, however, tend to accept the theory.

Supportive references almost unanimously agreed that a SPO manager's ideal formal education should consist of a bachelor's degree in engineering, followed by about six to eight year's experience and then a master's degree in management (Solberg and Steiner, 1972:29).

AF Acquisition Career Development - Past Findings

Two recent theses have studied AF Officer management career development: "The Impact of AFSC Regulation 36-5 on the 27XX Career Field" by Captain Kevin Lopez (AFIT/GSM/LSY/87S-17), and "Relative Importance of Selected Subject Areas for Acquisition Project Officer Training" by Captain Scott Smith (AFIT/GSM/LSY/88S-26). Both are relevant building blocks to this research and thus will be discussed briefly.

Captain Lopez's thesis studied the perceived acceptance of the then new Air Force Systems Command Regulation 36-5, Acquisition Management Professional Development, dated 9 Sep 88, which first introduced a definitive acquisition career path certification process. The regulation established four certification levels (which correspond to the three defined in AFR 36-27). The requirements for each certification level were divided into the same major development methods categories described earlier. The purpose of the study was to determine the perceived agreement of the "critical"

nature of the various development methods in relation to acquisition career development. These findings are quite relevant since these same development methods are cited in the new acquisition career path certification process (AFR 36-27). These findings substantiate the claim that the development methods are perceived to positively contribute to manager development.

In general, the findings for the five investigative questions established a positive relationship between AFSC Regulation 36-5 and Career development. In addition, the results of the supplemental study determined that the regulation's Acquisition Career Development model has the potential to improve the quality and development of the 27XX career field (Lopez, 1988:61).

The specific survey findings indicate a profound agreement (greater than 70% "strongly or moderately agreed" each development method was critical) that the development methods available to Air Force officers are critical to the Air Force manager's career development.

Captain Smith's thesis studied the specific course curriculum for the acquisition training courses (SYS 100, SYS 200, and other specialty courses). His objective was different, but built upon Captain Lopez's findings.

This research on the other hand, looks within the training courses for information applicable to the continual "fine tuning" effort to update and improve acquisition training (Smith, 1988:10).

The findings of this second thesis recommended a few curricula changes, but in general found the course subject areas satisfactory.

This indicates that the training courses have been designed to satisfy the needs of the SPO personnel, and in general are doing a good job of it (Smith, 1988:57).

Building from the results of these two previous theses, this study acknowledges that the development methods of the APDP are accepted and viable. The previous studies concentrated more on development methods and curriculum content; this study more broadly attempts to study the timing of the previously validated development methods.

Research Hypotheses

Having compiled a list of 14 management skills (defined earlier), hypotheses for Research Objectives 2 and 4 can now be stated. There are 14 hypotheses for Research Objective 2 and 14 hypotheses for Research Objective 4 (one for each of the 14 listed management skills). The hypotheses will each be stated and tested as null hypotheses. Research hypotheses for Research Objective 2 and 4 are provided in Tables 1 and 2, respectively.

Table 1

Research Objective 2 Hypotheses

RESEARCH OBJECTIVE: Determine the relation between skill importance and management level.

RESEARCH HYPOTHESES:

2A. There is no association between the perceived importance of the Controlling skill and each management level.

2B. There is no association between the perceived importance of the Decision Making skill and each management level.

2C. There is no association between the perceived importance of the Information Processing skill and each management level.

2D. There is no association between the perceived importance of the Leadership skill and each management level.

2E. There is no association between the perceived importance of the Motivation skill between the management levels.

2F. There is no association between the perceived importance of the Oral Communication skill and each management level.

2G. There is no association between the perceived importance of the Organizational Politics skill and each management level.

2H. There is no association between the perceived importance of the Planning skill and each management level.

2I. There is no association between the perceived importance of the Project Organization skill and each management level.

2J. There is no association between the perceived importance of the Resource Allocation skill and each management level.

2K. There is no association between the perceived importance of the Stress/Conflict Management skill and each management level.

2L. There is no association between the perceived importance of the Team-Building skill between the management levels.

2M. There is no association between the perceived importance of the Technical skill and each management level.

2N. There is no association between the perceived importance of the Written Communication skill and each management level.

Table 2

Research Objective 4 Hypotheses

RESEARCH OBJECTIVE: Determine the development method(s) most effective in developing each skill.

RESEARCH HYPOTHESES:

- 4A. There is no consensus of preferred development method(s) for the Controlling skill.
- 4B. There is no consensus of preferred development method(s) for the Decision Making skill.
- 4C. There is no consensus of preferred development method(s) for the Information Processing skill.
- 4D. There is no consensus of preferred development method(s) for the Leadership skill.
- 4E. There is no consensus of preferred development method(s) for the Motivation skill.
- 4F. There is no consensus of preferred development method(s) for the Oral Communication skill.
- 4G. There is no consensus of preferred development method(s) for the Organizational Politics skill.
- 4H. There is no consensus of preferred development method(s) for the Planning skill.
- 4I. There is no consensus of preferred development method(s) for the Project Organization skill.
- 4J. There is no consensus of preferred development method(s) for the Resource Allocation skill.
- 4K. There is no consensus of preferred development method(s) for the Stress/Conflict Management skill.
- 4L. There is no consensus of preferred development method(s) for the Team-Building skill.
- 4M. There is no consensus of preferred skills development method(s) for the Technical skill.
- 4N. There is no consensus of preferred development method(s) for the Written Communication skill.

Conclusion

The literature review has resulted in the compilation of 14 common management skills and 14 development methods available to Air Force managers. Thus, Research Objectives 1 and 3 have been met. Subsequently, the hypotheses for

Research Objectives 2 and 4 have been stated. The additional literature reviewed will facilitate test instrument design. The method of collecting and analyzing the test instrument data is discussed in detail in Chapter 3: Research Methodology.

III. Research Methodology

Introduction

This chapter outlines the design and methodology for this research study. In particular, this chapter will describe the: general research approach, population of interest, sampling selection plan and data collection, test instrument, variables under consideration, data analysis, and assumptions and limitations of the study. Note that this chapter was written after the survey instrument was distributed, but before any data analysis was performed. Thus, description of activities up to and including survey distribution use the past verb tense; subsequent activities such as data analysis are written in the future verb tense.

General Research Approach

Although career development for the 27XX and 0029 duty Air Force Specialty Codes (AFSC) has been developed by a select panel of experts, there has been little formal study of the subject. Only a few graduate studies have been conducted in this area, none of which have researched the timing of skills development based on need. A logical source of information about skills needs at a different management levels, is of course, the many "experts" currently in the 27XX and 0029 duty AFSC. Who better to determine the importance of the 14 skills (defined in Chapter 2) or which of the 14 development methods (also

defined in Chapter 2) best develops each skill? This realization leads inevitably to a research method based upon a survey of the perceptions of these experts. Due to the behavioral nature of the subject matter, a combination of non-parametric statistical tests, frequency distribution analysis, and qualitative analyses will be the methods used for this research.

Population of Interest

The population of interest for this research study consisted of Acquisition Project Officers (duty AFSC 2721 and 2724, Acquisition Management Officers (duty AFSC 2711 and 2716), and Program Directors (duty AFSC 0029), Groups 1, 2, and 3 respectively, within the three major product divisions within the Air Force Systems Command (AFSC). The three product divisions within the population of interest are: Aeronautical Systems Division (ASD), Electronic Systems Division (ESD), and Space Systems Division (SSD). Due to the differing types of systems acquired, and thus potentially different acquisition practices, the selection of three product divisions was determined to provide a more representative sample than would only one product division.

Based upon personnel listings obtained from the Air Force ATLAS Database, the population size was determined to consist of 1647 individuals. This can be further sub-categorized into 937 Acquisition Project Officers (207 2721's and 730 2724's), 679 Acquisition Management Officers

(229 2711's and 450 2716's), and 31 Program Directors (0029's).

Sampling Selection Plan and Data Collection

Sampling Selection Plan. Selection of the sample representing the above population of interest was determined in two steps. First, the overall sample size was computed based upon the sample size needed to statistically test the research hypotheses stated in Chapter 2. Secondly, the sample was proportionately stratified into three mutually exclusive sub-populations (one for each management level).

Overall Sample Size. Since non-parametric statistical tests will be conducted, a truly precise method of determining sample size was not possible. However, for the purposes of determining a justifiable sample size a logical method was used. The logical method consists of first determining (precisely) the sample size for the comparable parametric test, and then inflating that sample size to compensate for the non-parametric test's reduced efficiency.

To test for an association between each management level and the perceived importance of each of 14 skills, the non-parametric Spearman Rank Correlation Coefficient (R_s) will be calculated. Note that a non-parametric test will be used since the data collected will not be interval level data. The efficiency of this test in comparison to the

corresponding parametric test (Pearson's R) is 91% (Siegel, 1956:213).

Determining the sample size needed for the confidence interval for the parametric Pearson R test (Snedecor and Cochran, 1980:184-186), a sample size needed for a 90% confidence interval for a bound of + or - .1 R is 273.6. Inflating the sample size of 273.6 needed for the parametric test by 91% (due to the previously stated non-parametric inefficiency) yields a sample size of 300.6. Finally, inflating this sample size based upon an anticipated response rate of 50% (due to the voluntary nature of the survey) yields a sample size of 601.

Sample Stratification. In order to ensure the sample accurately represents the population, the 601 individuals to surveyed must be proportionate to the number of individuals of each sub-population (management level) in the population (Emory, 1985:306-312). The only exception was Group 3 (duty AFSC 0029). Since there are only 31 Program Directors in the population and a response rate much less than 50% was anticipated, all 31 individuals were surveyed. This leaves 570 to be stratified amongst the two remaining management levels. The following number of surveys were distributed to each of the following groups: Group 1 - 324 (2721 - 72, 2724 - 252), and Group 2 - 246 (2711 - 78, 2716 - 168). These sampling quantities were proportionate to the population. Furthermore, each was divisible by three; so that an equal number of surveys were

be allotted to each product division (ASD, ESD, and SSD) for each group. Proportions of one-third for each Product Division were selected (versus proportionate to the number of personnel) to gain a equal representation of the three different types of systems being acquired. Though not used, an alternative survey allotment could have been proportioned based upon the number of personnel assigned to each product division.

Data Collection. The Air Force ATLAS Database included mailing labels for each individual. 601 surveys (and pre-addressed return envelopes) were distributed to randomly selected individuals in accordance with the stratification requirements stated above. Although the survey cover letter requested responses within 10 working days after receipt, data will be accepted for four calendar weeks. At that time, all surveys will be collected and converted into numerical data format. Surveys received after that time will be disregarded.

Test Instrument

The purpose of the survey was fourfold: 1) collect classification and background information, 2) to measure the perceived importance of the 14 skills, 3) to measure the preferred method(s) to develop each skill, and 4) to garner qualitative inputs on skills, development methods, and general career development philosophies. The survey designed to meet the above stated purposes was further

moderated by two goals: 1) provide accurate and unbiased data, and 2) make the survey clear and easy to complete.

To meet the first goal, sources describing survey design were carefully studied (Emory, 1985:199-240), (Guilford, 1954:170-190). Key considerations were: question order, use of distinctive vocabulary for ranking, and avoidance of "central tendency" and "halo effect". In order to have each respondent rate the exact same 14 skills and 14 development methods, the definitions in Chapter 2 were provided. Also, the respondent was cautioned to use the definitions provided, even if his/her own definition might differ.

The second goal of making a clear and easy to complete test instrument was accomplished by incorporating the comments of: survey experts, Air Force Manpower Personnel Command (AFMPC), and the 20 individuals who completed a prototype survey. Finally, the survey cover letter stated the importance and intended use of the data being collected and was signed by the research sponsor, Mr. Teddy Houston, Acting Director of Acquisition Career Management, Office of the Assistant Secretary (Acquisition) of the Air Force. The survey cover letter, approved survey, and AFMPC approval letter are presented in Appendix A.

Variables Under Consideration

The variables of interest are the 14 common management skills and the 14 development methods available to Air Force

officers as defined in Chapter 2. These variables are listed in the table below.

Table 3
Variables Under Consideration

VARIABLE	VARIABLE DESCRIPTION
Skills	THE FOURTEEN MANAGEMENT SKILLS
S1	Controlling
S2	Decision Making
S3	Information Processing
S4	Leadership
S5	Motivation
S6	Oral Communication
S7	Organizational Politics
S8	Planning
S9	Project Organization
S10	Resource Allocation
S11	Stress/Conflict Management
S12	Team-Building
S13	Technical
S14	Written Communication
Methods	FOURTEEN SKILLS DEVELOPMENT METHODS
M1	Project Officer (PO)/Program Manager (PM) Experience
M2	Observational Experience
M3	General Acquisition Experience
M4	Operational Experience
M5	Headquarters Experience
M6	General Training
M7	Short Courses
M8	Long Courses
M9	Technical Bachelor's Degree
M10	Non-Technical Bachelor's Degree
M11	Graduate Degree
M12	Squadron Officer School
M13	Intermediate Service School
M14	Senior Service School

Data Analysis

The data analysis will be conducted in six major groups: Preliminary Analysis, Research Objective 1 Analysis, Research Objective 2 Analysis, Research Objective 3 Analysis, Research Objective 4 Analysis, and Respondent Comments Analysis.

Preliminary Analysis. In order to assess the degree to which the sample represents the population, an analysis will be performed to determine response rates, and sample population background information. The overall response rate will be determined and sub-categorized by group, duty AFSC, Product Division, and military rank. Each group's (management levels 1, 2, and 3) average background will be assessed in the four major development methods areas: Experience, Training, Education, and Professional Military Education (PME).

Research Objective 1 Analysis. Any skills repeatedly mentioned on the qualitative section of the survey in addition to the 14 presented will be described for the benefit of future research.

Research Objective 2 Analysis. As previously stated, to test for an association between each management level and the perceived importance of each of 14 skills, the non-parametric Spearman Rank Correlation Coefficient Rho (R_s) will be calculated. This coefficient can range from -1 to +1. A negative number indicates a negative association (decreasing skill importance as management level increases),

a positive number indicates a positive association (increasing skill importance as management level increases). The smaller the magnitude of the number, the lesser the association (a zero indicates no association).

Since there are three group levels, 4 different R_s values can be calculated for each skill: 1) Group 1 and 2 versus skill importance, 2) Group 2 and 3 versus skill importance, 3) Group 1 and 3 versus skill importance, and 4) Groups 1, 2, and 3 versus skill importance. The fourth R_s value is of major interest since it describes the overall association between all three group levels and skill importance. The other three R_s values, however, may provide useful insights to that overall R_s value and may even provide other useful information.

Once determined, the coefficient can further be converted into a "t" statistic using the formula:
$$t = R_s * [(N-2)/(1-R_s^2)]^{1/2} \text{ (Siegel, 1956:212).}$$
 Using a standard t-distribution table, a null hypothesis of "no association" will be accepted if the "t" statistic calculated is less than the critical value in the table for the appropriate degrees of freedom (N-2) and significance level of alpha (α) 0.10, two-tail test. Conversely, a "t" statistic greater than the critical value results in rejection of the null, thus a conclusion of "significant" trend will be made. In order to declare an overall association (REJECT the null hypothesis) between group level and skill importance, all four R_s values must be

statistically significant. Partial rejection will be declared when only one sub-group (group 1 & 2 for example) has a t value greater than the critical value. An example describing the mechanics of determining Rs and the "t" statistic is presented in Appendix B.

Research Objective 3 Analysis. Any development methods repeatedly mentioned on the qualitative section of the survey in addition to the 14 presented will be described for the benefit of future research.

Research Objective 4 Analysis. To determine the development method(s) most effective, a frequency distribution of the number of times each development method (M1 - M14) is selected will be calculated for each skill. A histogram will be plotted, and the three most frequently selected methods will be designated the overall "best" method(s). A hypothesis will be REJECTED if any "preferred" development method is selected by at least 25% (50 individuals) of the respondents.

Respondent Comments. Any comments (other than skills or development methods), especially in the area of general career development philosophies, mention repeatedly will be described. These comments may be useful in areas outside the scope of this study and may add insight to any conclusions reached. These comments may, of course, benefit future research in this topic area.

Assumptions and Limitations of the Study

1. The data is representative of the true relationship that exists between the variables and the real world (measurement is valid).
2. The measures of the data are reliable.
3. The sample is representative of the population.
4. The definitions and measurements of the previous studies are valid and reasonable.
5. The study is limited to nonrated USAF Officer program managers.
6. The survey includes a qualitative section for identification of additional skills and development methods by each respondent, and his/her general opinion of the current career path, however, these will not be included in the quantitative analysis.
7. The skills and development methods rankings will be based upon the definitions provided in the survey; personal bias by the respondent may occur.

IV. Data Analysis

Introduction

This chapter presents the analysis of the test instrument data. The analysis will be divided into six parts: Preliminary, Research Objectives 1 - 4, and Respondent comments.

Preliminary Analysis

The purpose of this analysis is to assess the degree to which the sample represents the population. This analysis was performed in two areas: response rates, and sample background information.

Response Rates. The response rate was determined by counting the number of "useable" (complete and optically readable) surveys received by the cut-off date. Most of the surveys received were useable. The overall response rate was lower than expected. Interestingly, Group 3, Program Directors (duty Air Force Specialty Code (AFSC) 0029) had the highest response rate, but was anticipated to be the lowest. A table summarizing the response rates is provided below. Graphical representations of response rates by military rank (a fairly representative response), and by Group level by Product Division (Aeronautical Systems Division (ASD), Electronic Systems Division (ESD), and Space Systems Division (SSD)) are also provided. These findings indicate the sample is representative of the population.

TABLE 4

Survey Response Rates

CATEGORY		# SENT	NUMBER USEABLE	RESPONSE RATE
OVERALL		601	211	35%
DUTY AFSC				
Acquisition	2721	72	22	31%
Project Officers	2724	252	90	36%
Acquisition	2711	78	15	19%
Management Officers	2716	168	69	41%
Program Directors	0029	31	15	48%
GROUP				
Group 1:	2721/2724	324	112	35%
Group 2:	2711/2716	246	84	34%
Group 3:	0029	31	15	48%
Product Division				
ASD		201	108	54%
ESD		200	57	29%
SSD		200	46	23%

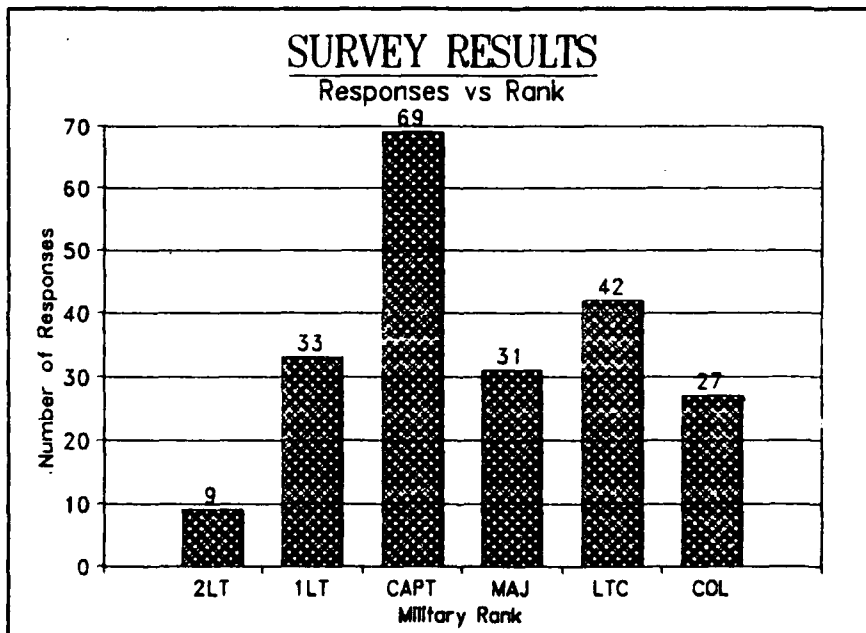


Figure 2 - Survey Responses Versus Military Rank

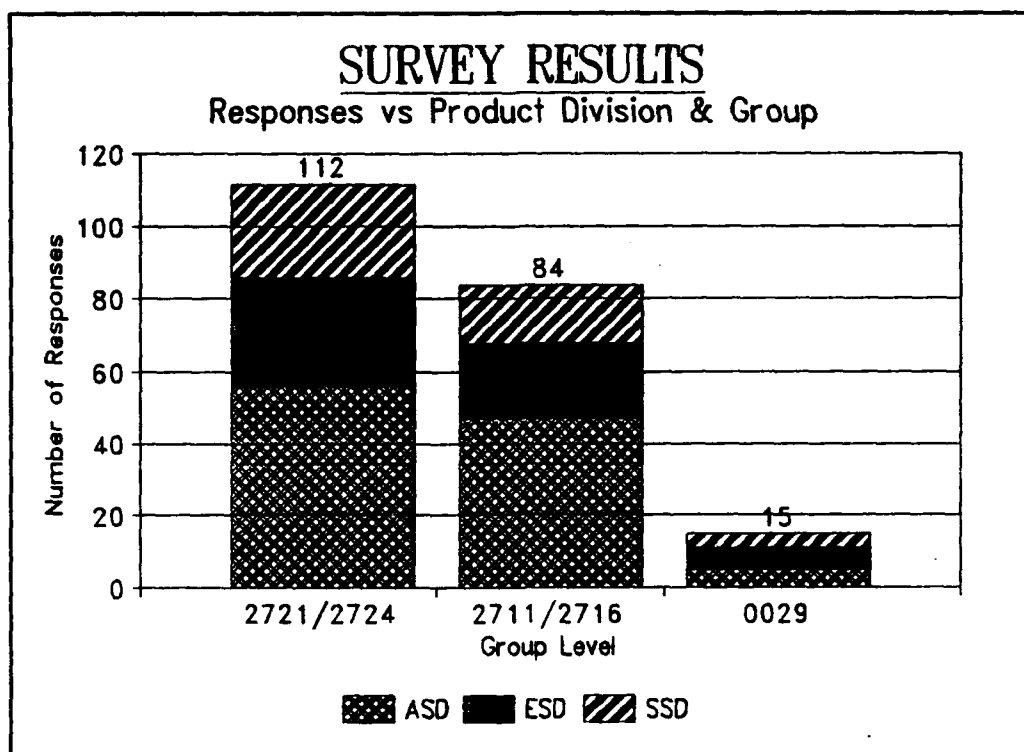


Figure 3 - Survey Responses by Product Division versus Group Level

Background Information. The average backgrounds of each group (management levels 1, 2, and 3) provide some useful information. The average backgrounds were assessed in the four major development methods areas: Experience, Training, Education, and Professional Military Education (PME). Graphs representing each of the four major development methods are presented below. Looking at the experience backgrounds, there is a fairly good distribution of the five types (Project Officer (PO)/Program Manager (PM), Observational, General Acquisition, Operations, and Headquarters. PO/PM is by far the most prevalent,

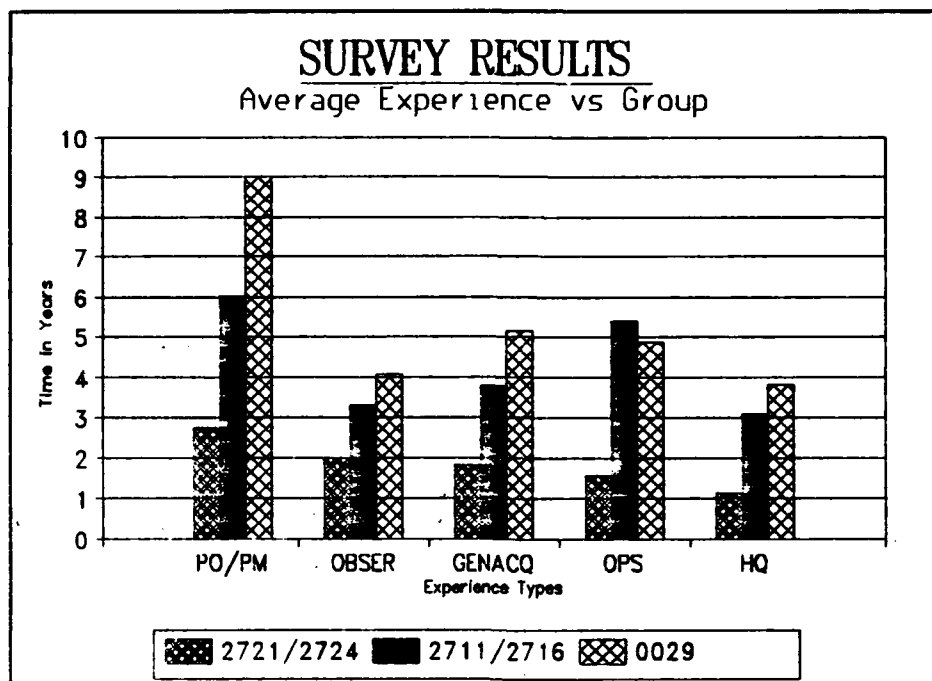


Figure 4 - Background Experience Versus Group Level

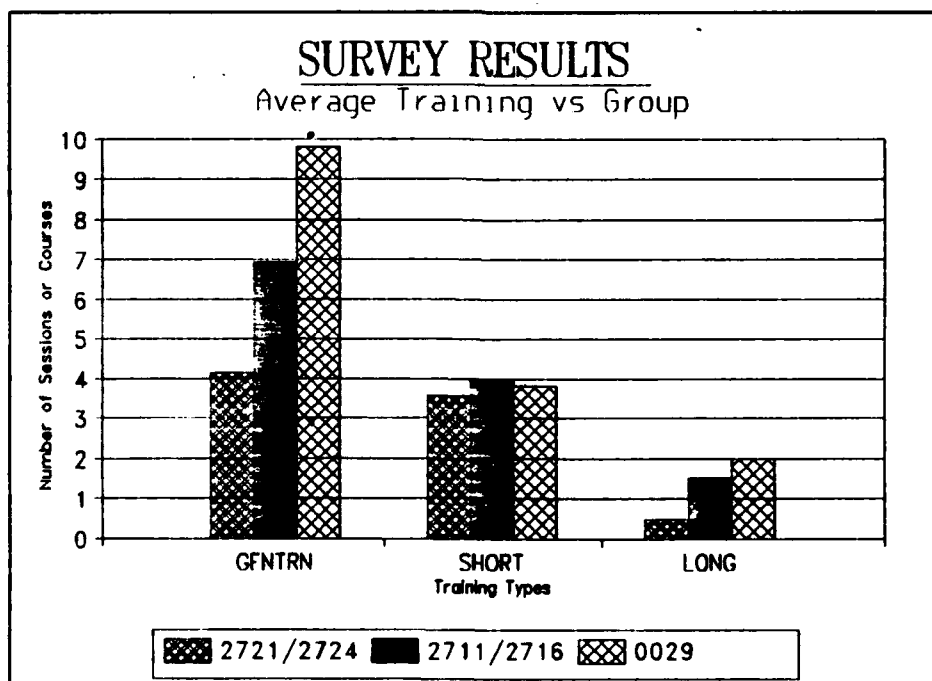


Figure 5 - Background Training Versus Group Level

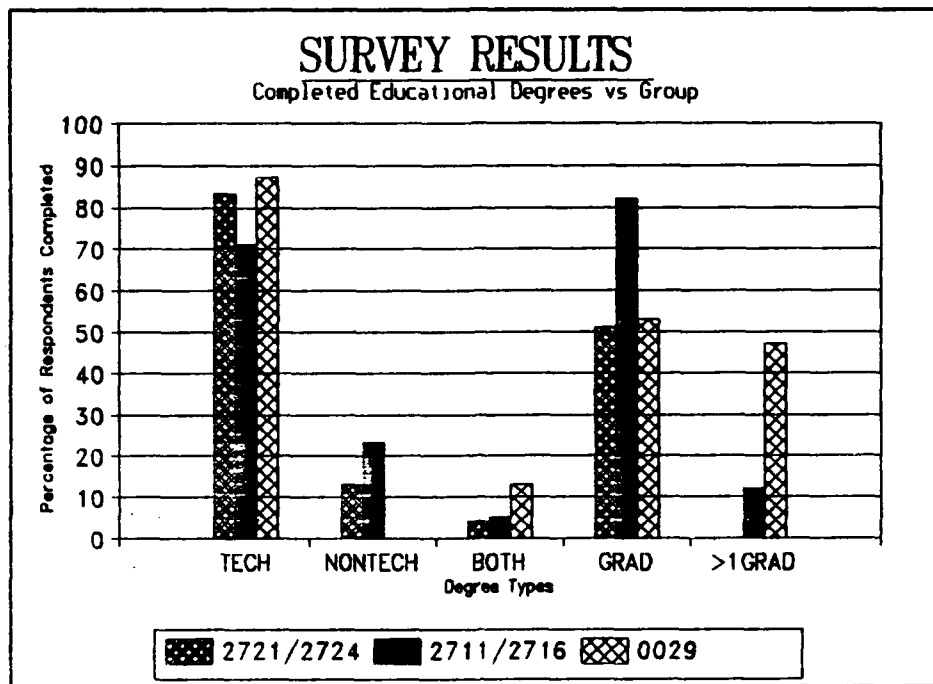


Figure 6 - Background Education Versus Group Level

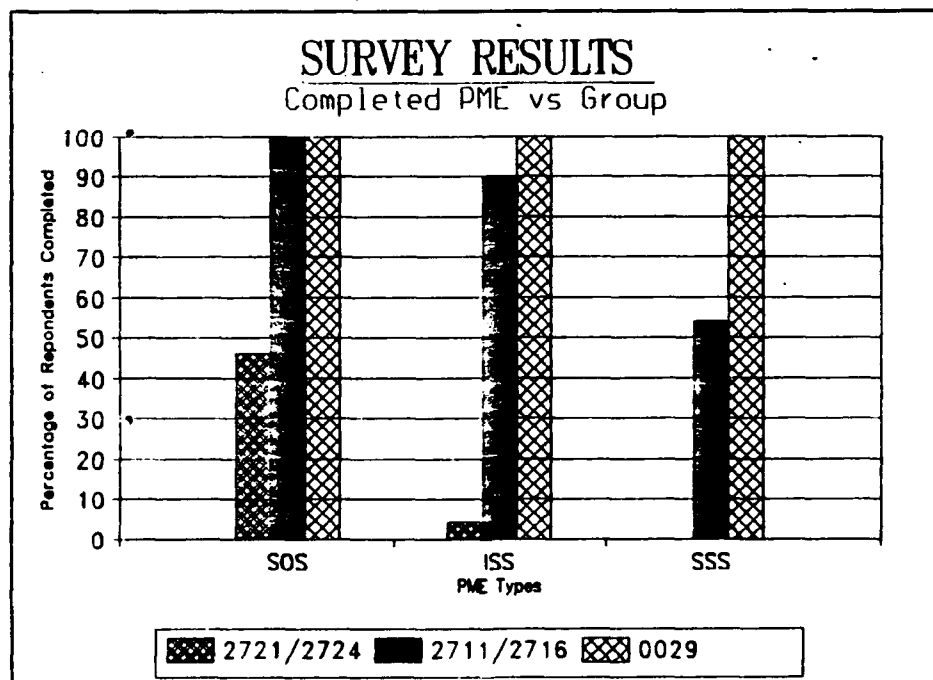


Figure 7 - Background PME Versus Group Level

especially by Program Directors (duty AFSC 0029). Operational experience is the next most prevalent, but mostly by group 2. Training backgrounds reveal an abundance of General Training, but more interestingly, management level 3 predominates. This indicates either that training comes late in an Air Force officer's career, or perhaps that there was a "rush" of training by duty AFSC 0029 in order to meet the "new" certification requirements. The education backgrounds reveal a large percentage of technical bachelor and graduate degrees. Notably, a very large percentage of group 3 possesses more than one graduate degree. The predominance of technical bachelor's degrees may be key to later discussions. Finally, the high percentage of completion of PME is no surprise since in the Air Force PME is highly encouraged (i.e. mandatory).

Research Objective 1 Analysis

Research Objective 1 was to compile a list of common skills used by managers. This was done in Chapter 2. A reiteration of the 14 common skills is presented in the table below (the definition of each was provided in Chapter 2). The survey instrument requested the respondents provide comments in two skills areas: 1) which skills have been omitted from the survey, and 2) how have your "skills needs" changed over time?

In regard to the first question, the respondents indicated several "missing" skills. Four that were

Table 5

Original List of Common Management Skills

THE FOURTEEN MANAGEMENT SKILLS
Controlling
Decision Making
Information Processing
Leadership
Motivation
Oral Communication
Organizational Politics
Planning
Project Organization
Resource Allocation
Stress/Conflict Management
Team-Building
Technical
Written Communication

repeatedly mentioned were: 1) Personnel Management (hiring, firing, selection of the "right" people), 2) Time Management, 3) Delegation, and 4) Computer Literacy. These four skills were not included in the quantitative part of the survey and thus cannot be analyzed. These four additional skills should, however, be considered for any future research.

The second question (how have skills needs have changed over time) resulted in many lengthy comments. Four basic themes predominated. First, managers transition from little responsibility to greater responsibility. This theme will be of major significance in later discussions. Second, managers start by working alone and in great detail; later, they work as a team leader providing broad goals. Third,

not only do "skills needs" change, but how the skill is used changes. For example, decision making early in a manager's career is based on "all the facts"; later, a manager must learn to make decisions based on limited, and often incomplete information. Finally, several comments stated that in addition to needing certain skills, personal attributes were essential to competent management. Having all the skills won't help a manager who lacks common sense.

Research Objective 2 Analysis

Research Objective 2 was to determine the relation between skill importance and management level. This analysis will be divided into the 15 sections. One for each of the fourteen hypotheses stated in Chapter 2 (Table 1), and a summary of the results of all 14 hypotheses. The analysis for each hypothesis will be on a separate page, and each will be presented in the same format. Recall that four R_s (Spearman Rank Correlation Coefficient) values were to be calculated for each skill: $R_{s_{123}}$ (all three groups versus skill importance), $R_{s_{12}}$ (Groups 1 and 2 versus skill importance), $R_{s_{13}}$ (Groups 1 and 3 versus skill importance), and $R_{s_{23}}$ (Groups 2 and 3 versus skill importance). To Reject the null hypothesis, all four R_s values must be statistically significant at the $\alpha = .1$ (two tail) level. Partial rejection occurs when some (but not all) of the R_s values are significant. Acceptance of the null hypotheses occurs when one or less of the R_s values is significant.

Hypothesis 2A. There is no association between the perceived importance of the Controlling skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 6
Controlling Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.6192	.7440	.8556
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		.2661*	
Groups 1 and 2: Rs_{12}		.2233*	
Groups 1 and 3: Rs_{13}		.2569*	
Groups 2 and 3: Rs_{23}		.1436*	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Controlling skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is REJECTED: There is A SIGNIFICANT association between the perceived importance of the Controlling skill and each management level.

Hypothesis 2B. There is no association between the perceived importance of the Decision Making skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 7
Decision Making Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.7598	.8496	.9333
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		.2054*	
Groups 1 and 2: Rs_{12}		.1655*	
Groups 1 and 3: Rs_{13}		.2042*	
Groups 2 and 3: Rs_{23}		.1274*	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Decision Making skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is REJECTED: There is A SIGNIFICANT association between the perceived importance of the Decision Making skill and each management level.

Hypothesis 2C. There is no association between the perceived importance of the Information Processing skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 8
Information Processing Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.7058	.7722	.8333
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		.1502*	
Groups 1 and 2: Rs_{12}		.1231*	
Groups 1 and 3: Rs_{13}		.1496*	
Groups 2 and 3: Rs_{23}		.0851	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Information Processing skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups except groups 2 & 3. The high level of association between groups 1 and 2, misleadingly results in the high association between groups 1, 2, and 3 and groups 1 and 3. Hence, the hypothesis is partially rejected: There is A SIGNIFICANT association between the perceived importance of the Information Processing skill and management levels 1 and 2.

Hypothesis 2D. There is no association between the perceived importance of the Leadership skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 9
Leadership Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.6214	.7550	.9333
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: RS_{123}		.3074*	
Groups 1 and 2: RS_{12}		.2363*	
Groups 1 and 3: RS_{13}		.3298*	
Groups 2 and 3: RS_{23}		.2379*	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Leadership skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is REJECTED: There is A SIGNIFICANT association between the perceived importance of the Leadership skill and each management level.

Hypothesis 2E. There is no association between the perceived importance of the Motivation skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 10
Motivation Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.5284	.6657	.7556
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: RS_{123}		.3086*	
Groups 1 and 2: RS_{12}		.2734*	
Groups 1 and 3: RS_{13}		.2730*	
Groups 2 and 3: RS_{23}		.1241*	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Motivation skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is REJECTED: There is A SIGNIFICANT association between the perceived importance of the Motivation skill and each management level.

Hypothesis 2F. There is no association between the perceived importance of the Oral Communication skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 11
Oral Communication Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.7204	.7312	.9000
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		.1048	
Groups 1 and 2: Rs_{12}		.0295	
Groups 1 and 3: Rs_{13}		.2053*	
Groups 2 and 3: Rs_{23}		.2293*	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Oral Communication skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between groups 1 & 3, and 2 & 3. The high level of association between groups 2 and 3, misleadingly results in the high association between groups 1 and 3. Hence, the hypothesis is partially rejected: There is A SIGNIFICANT association between the perceived importance of the Oral Communication skill and management levels 2 and 3.

Hypothesis 2G. There is no association between the perceived importance of the Organizational Politics and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 12
Organizational Politics Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.5490	.6181	.7222
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}	.1910*		
Groups 1 and 2: Rs_{12}	.1402*		
Groups 1 and 3: Rs_{13}	.2221*		
Groups 2 and 3: Rs_{23}	.1561*		

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Organizational Politics skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is REJECTED: There is A SIGNIFICANT association between the perceived importance of the Organizational Politics skill and each management level.

Hypothesis 2H. There is no association between the perceived importance of the Planning skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 13
Planning Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.6301	.6756	.6889
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: RS_{123}		.1139*	
Groups 1 and 2: RS_{12}		.1088	
Groups 1 and 3: RS_{13}		.0200	
Groups 2 and 3: RS_{23}		.0867	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Planning skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between groups 1, 2, & 3 only. There is no statistically significant association between any two groups. Hence, the hypothesis is ACCEPTED: There is NO SIGNIFICANT association between the perceived importance of the Planning skill and each management level.

Hypothesis 2I. There is no association between the perceived importance of the Project Organization skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 14
Project Organization Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.6085	.5956	.5333
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		-.0580	
Groups 1 and 2: Rs_{12}		-.0424	
Groups 1 and 3: Rs_{13}		-.0707	
Groups 2 and 3: Rs_{23}		-.0372	

The perceived importance of the Project Organization skill decreases from group 1 through to group 3. There is no significant association between skill importance and management level between any of the groups. The hypothesis is ACCEPTED: There is NO SIGNIFICANT association between the perceived importance of the Project Organization skill and each management level.

Hypothesis 2J. There is no association between the perceived importance of the Resource Allocation skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 15
Resource Allocation Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.5381	.6230	.7111
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		.2013*	
Groups 1 and 2: Rs_{12}		.1626*	
Groups 1 and 3: Rs_{13}		.2091*	
Groups 2 and 3: Rs_{23}		.1181*	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Resource Allocation skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is REJECTED: There is A SIGNIFICANT association between the perceived importance of the Resource Allocation skill and each management level.

Hypothesis 2K. There is no association between the perceived importance of the Stress/Conflict Management skill and each management level. The relevant statistics pertaining to this hypothesis are provided below.

TABLE 16
Stress/Conflict Management Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.5128	.5589	.6778
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}	.1875*		
Groups 1 and 2: Rs_{12}	.1290*		
Groups 1 and 3: Rs_{13}	.2319*		
Groups 2 and 3: Rs_{23}	.1855*		

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Stress/Conflict Management skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is **REJECTED**: There is A **SIGNIFICANT** association between the perceived importance of the Stress/Conflict Management skill and each management level.

Hypothesis 2L. There is no association between the perceived importance of the Team-Building skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 17
Team-Building Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.5382	.6627	.8111
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}	.2601*		
Groups 1 and 2: Rs_{12}	.2029*		
Groups 1 and 3: Rs_{13}	.2834*		
Groups 2 and 3: Rs_{23}	.1746*		

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Team-Building skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between all groups (1 & 2, 1 & 3, 2 & 3, and 1, 2, & 3). The hypothesis is REJECTED: There is A SIGNIFICANT association between the perceived importance of the Team-Building skill and each management level.

Hypothesis 2M. There is no association between the perceived importance of the Technical skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 18
Technical Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.4771	.5004	.5556
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		.0636	
Groups 1 and 2: Rs_{12}		.0511	
Groups 1 and 3: Rs_{13}		.0655	
Groups 2 and 3: Rs_{23}		.0381	

The perceived importance of the Technical skill increases from group 1 through to group 3. There is no significant association between skill importance and management level between any groups. The hypothesis is **ACCEPTED**: There is NO SIGNIFICANT association between the perceived importance of the Technical skill and each management level.

Hypothesis 2N. There is no association between the perceived importance of the Written Communication skill and each management level. The relevant statistics pertaining to this hypothesis are provided in the table below.

TABLE 19

Written Communication Skill Statistics

STATISTIC	Group 1	Group 2	Group 3
Average Rating of Skill (Perceived) Importance (0 - 1 <highest>)	.6051	.6210	.7000
Spearman Rank Correlation Coefficient (Rho) between: Groups 1, 2, & 3: Rs_{123}		.0631	
Groups 1 and 2: Rs_{12}		.0109	
Groups 1 and 3: Rs_{13}		.1401*	
Groups 2 and 3: Rs_{23}		.1443*	

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The perceived importance of the Written Communication skill increases from group 1 through to group 3. There is a significant association between skill importance and management level between groups 1 & 3, and 2 & 3 only. The high level of association between groups 2 and 3, misleadingly results in the high association between groups 1 and 3. Hence, the hypothesis is partially rejected: There is A SIGNIFICANT association between the perceived importance of the Written Communication skill and management levels 2 and 3.

Research Objective 2 Hypotheses Summary. A summary of all 14 hypotheses is provided in the Table 20. Contrary to the anticipated outcome, for every significantly associated skill the association was positive. There will be more discussion of this in Chapter 5. A summary of how important each skill is to each group is provided in Table 21.

TABLE 20

Summary of Research Objective 2 Hypotheses

HYPOTHESIS/SKILL	Significant* Association? (Group Level VERSUS Skill Importance)	Partial* Association With Which Groups?
2A: CONTROLLING	YES	N/A
2B: DECISION MAKING	YES	N/A
2C: INFORMATION PROCESSING	PARTIAL	Grps 1 & 2
2D: LEADERSHIP	YES	N/A
2E: MOTIVATION	YES	N/A
2F: ORAL COMMUNICATION	PARTIAL	Grps 2 & 3
2G: ORGANIZATIONAL POLITICS	YES	N/A
2H: PLANNING	NO	N/A
2I: PROJECT ORGANIZATION	NO	N/A
2J: RESOURCE ALLOCATION	YES	N/A
2K: STRESS/CONFLICT MANAGEMENT	YES	N/A
2L: TEAM-BUILDING	YES	N/A
2M: TECHNICAL	NO	N/A
2N: WRITTEN COMMUNICATION	PARTIAL	Grps 2 & 3

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

TABLE 21**Summary of Skill Importance Ranked by Each Group**

SKILL	Group 1 Ranking	Group 2 Ranking	Group 3 Ranking
Controlling	6	4	4
Decision Making	1	1	1
Information Processing	3	2	5
Leadership	5	3	2
Motivation	12	7	7
Oral Communication	2	5	3
Organizational Politics	9	11	8
Planning	4	6	11
Project Organization	7	12	14
Resource Allocation	11	9	9
Stress/Conflict Management	13	13	12
Team-Building	10	8	6
Technical	14	14	13
Written Communication	8	10	10

Ranking: 1 = highest average importance, 14 = lowest

Research Objective 3 Analysis

Research Objective 3 was to compile a list of development methods available to Air Force managers. This was done in Chapter 2. A reiteration of the 14 development methods available to Air Force managers is presented in the table below (the definition of each was provided in Chapter 2).

Table 22

**Original List of Development Methods
Available to Air Force Managers**

THE FOURTEEN DEVELOPMENT METHODS

Project Officer (PO)/Program Manager (PM)
Experience
Observational Experience
General Acquisition Experience
Operational Experience
Headquarters Experience
General Training
Short Courses
Long Courses
Technical Bachelor's Degree
Non-Technical Bachelor's Degree
Graduate Degree
Squadron Officer School
Intermediate Service School
Senior Service School

The survey instrument requested the respondents provided comments in two development methods areas: 1) which development methods have been omitted from the survey, and 2) how does one best develop skills?

Concerning the first question, the only predominantly stated development method available to Air Force managers "missing" from the survey was Mentorship/Apprenticeship. Two other development methods mentioned by several respondents were Feedback/Counseling, and activities outside the USAF (either pre-USAF <High School, ROTC, etc.> or extra-curricular activities <team sports, church, etc.>).

Regarding the second question, the overwhelming consensus on the best way to develop any skill is to first

be introduced to the skill (either formally or by observation) and then to actually experience the skill. This observation will be key in later discussions. There were many comments concerning the need or benefit of an operational background as a developmental method. This controversial topic was discussed from all ends of the spectrum: from the extreme, "only operators should be program managers" to a more moderate, "operational backgrounds are beneficial but not mandatory" to the other extreme, "trained managers should manage, operators should operate." Other than the number of respondents who selected Operational Experience for each skill, this topic is beyond the scope of this study. A detailed study, however, concerning this very topic has been conducted by a fellow graduate student, Captain Andrew Abraham, and is contained in his thesis, An Analysis of the Benefits of Operational Experience Acquired by Air Force Systems Command (AFSC) Officers Through the Broadening Experience Tour (BEST) Program.

Research Objective 4 Analysis

Research Objective 4 was to determine the development method(s) most effective in developing each skill. This analysis will be divided into the 15 sections. One for each of the fourteen hypotheses stated in Chapter 2 (Table 2), and a summary of the results of all 14 hypotheses. The

analysis for each hypothesis will be on a separate page, and each will be presented in the same format.

Recall that a frequency distribution (number of respondents selecting each development method versus development method) was to be constructed for each skill. To reject the null hypothesis, at least 50 respondents (approximately 25%) had to select one (or more) development method(s). Acceptance of the null hypothesis occurs when no single development method is selected by at least 25% of the respondents. There is no partial rejection of the null hypothesis for Research Objective 4.

Hypothesis 4A. There is no consensus of preferred development method(s) for the Controlling skill. The histogram of the preferred development methods is presented in the figure below.

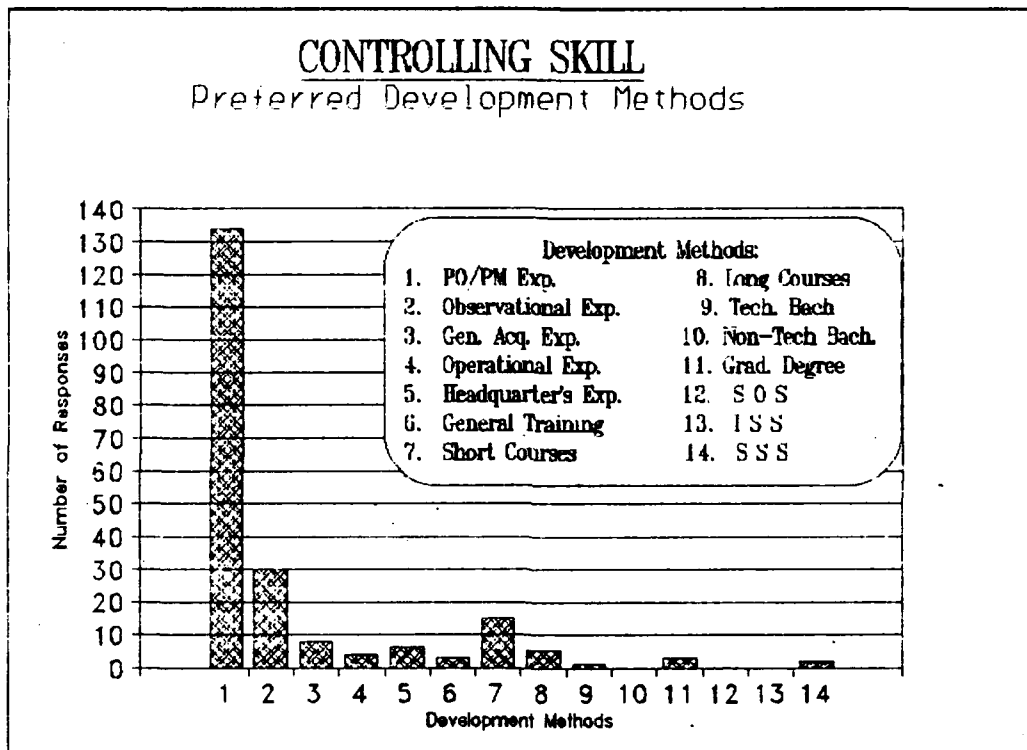


Figure 8 - Controlling Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (64%), 2) Observational Experience (14%), and 3) Short Courses (7%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Controlling skill.

Hypothesis 4B. There is no consensus of preferred development method(s) for the Decision Making skill. The histogram of the preferred development methods is presented in the figure below.

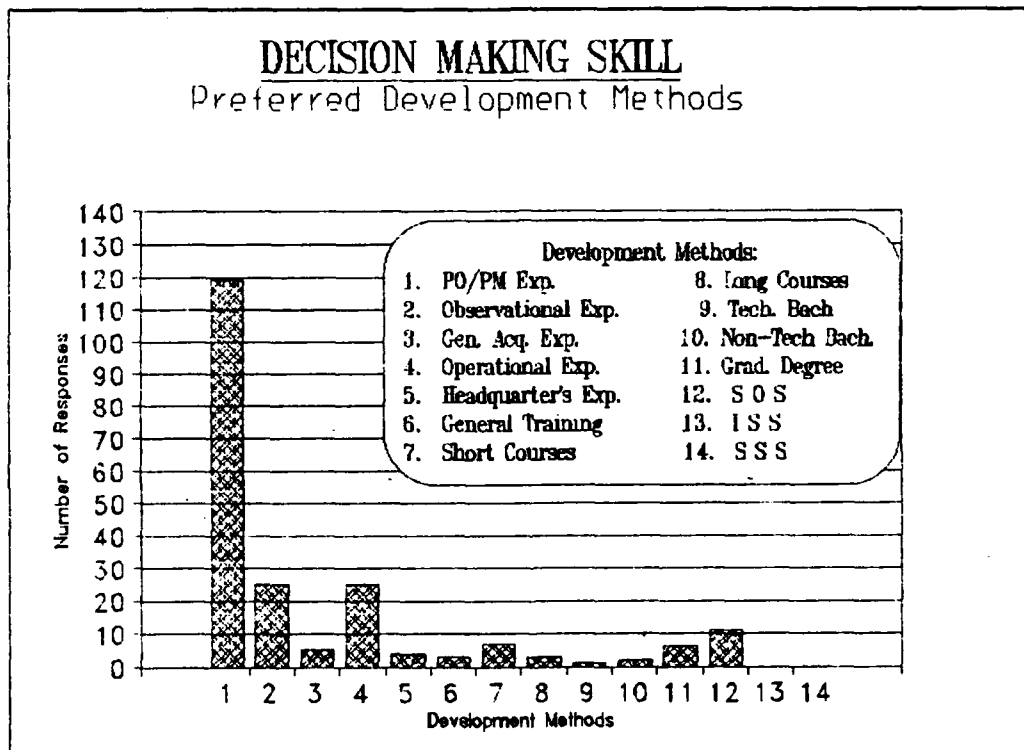


Figure 9 - Decision Making Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (56%), 2) Observational Experience (12%), and 3) Operational Experience (12%). The hypothesis is **REJECTED**: There is A **CONSENSUS** of preferred development methods for the Decision Making skill.

Hypothesis 4C. There is no consensus of preferred development method(s) for the Information Processing skill. The histogram of the preferred development methods is presented in the figure below.

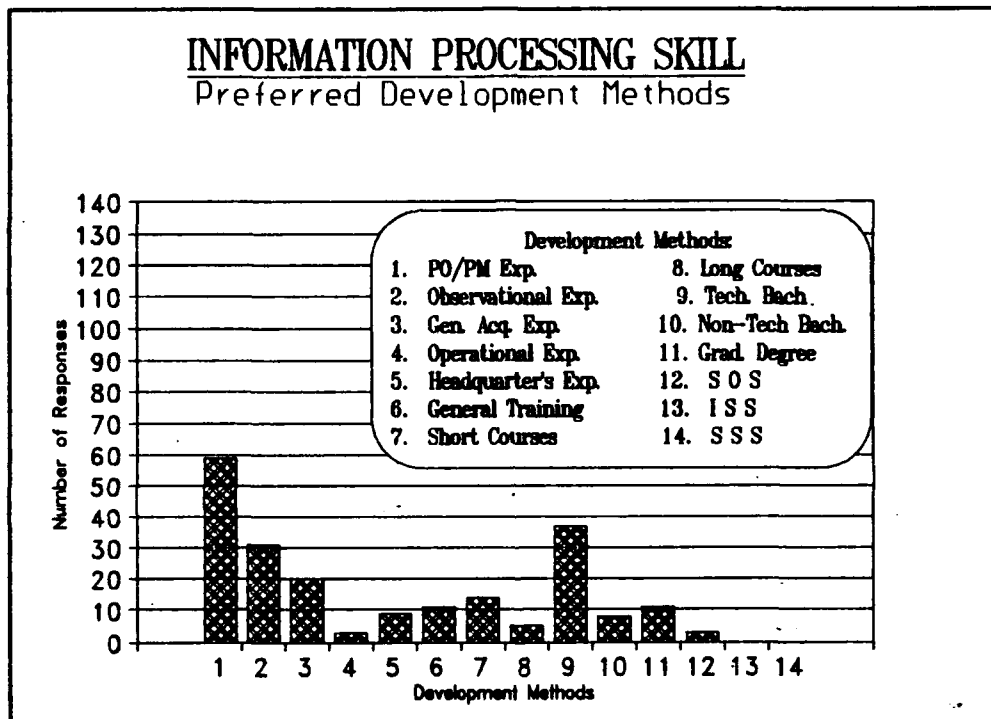


Figure 10 - Information Processing Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (28%), 2) Technical Bachelor's Degree (18%), and 3) Observational Experience (15%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Information Processing skill.

Hypothesis 4D. There is no consensus of preferred development method(s) for the Leadership skill. The histogram of the preferred development methods is presented in the figure below.

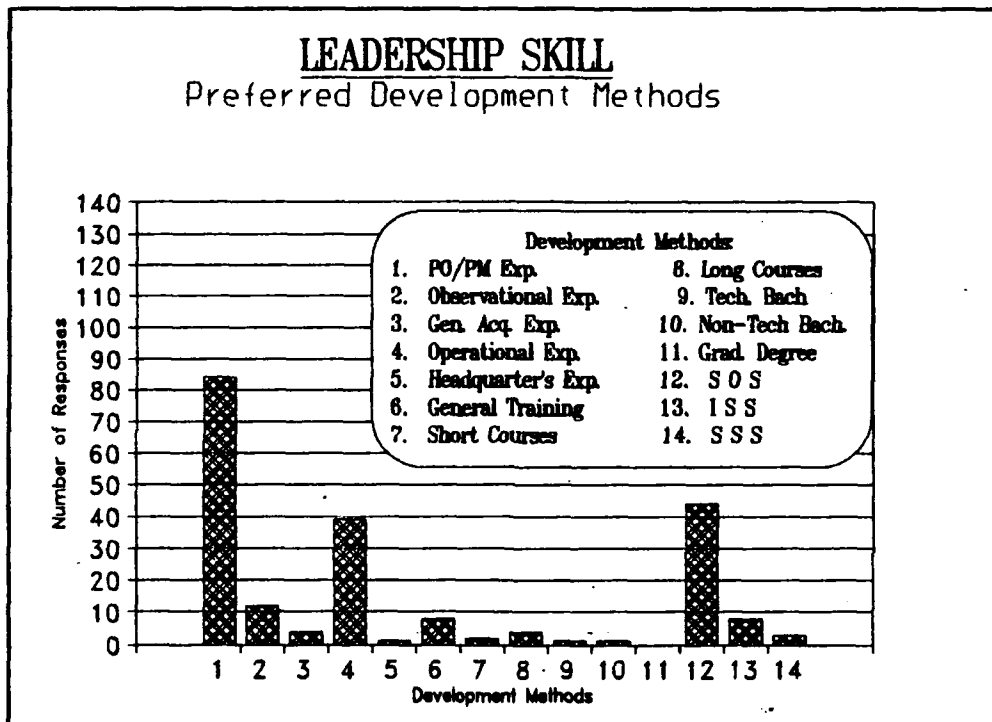


Figure 11 - Leadership Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (40%), 2) SOS (21%), and 3) Operational Experience (19%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Leadership skill.

Hypothesis 4E. There is no consensus of preferred development method(s) for the Motivation skill. The histogram of the preferred development methods is presented in the figure below.

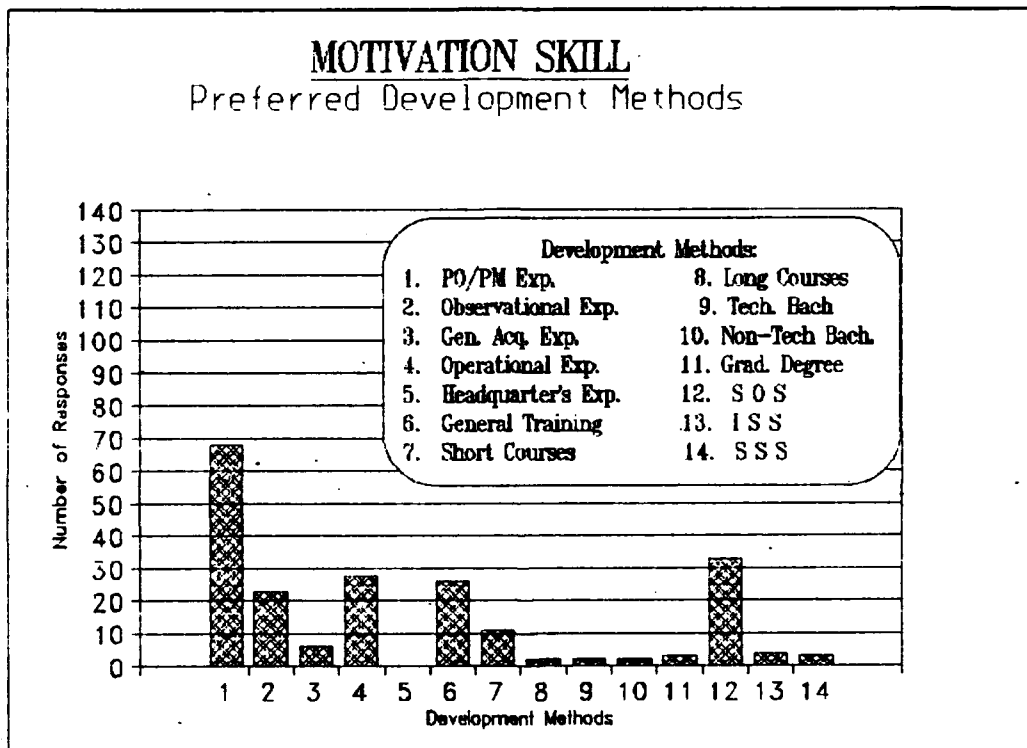


Figure 12 - Motivation Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (32%), 2) SOS (16%), and 3) Operational Experience (13%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Motivation skill.

Hypothesis 4F. There is no consensus of preferred development method(s) for the Oral Communication skill. The histogram of the preferred development methods is presented in the figure below.

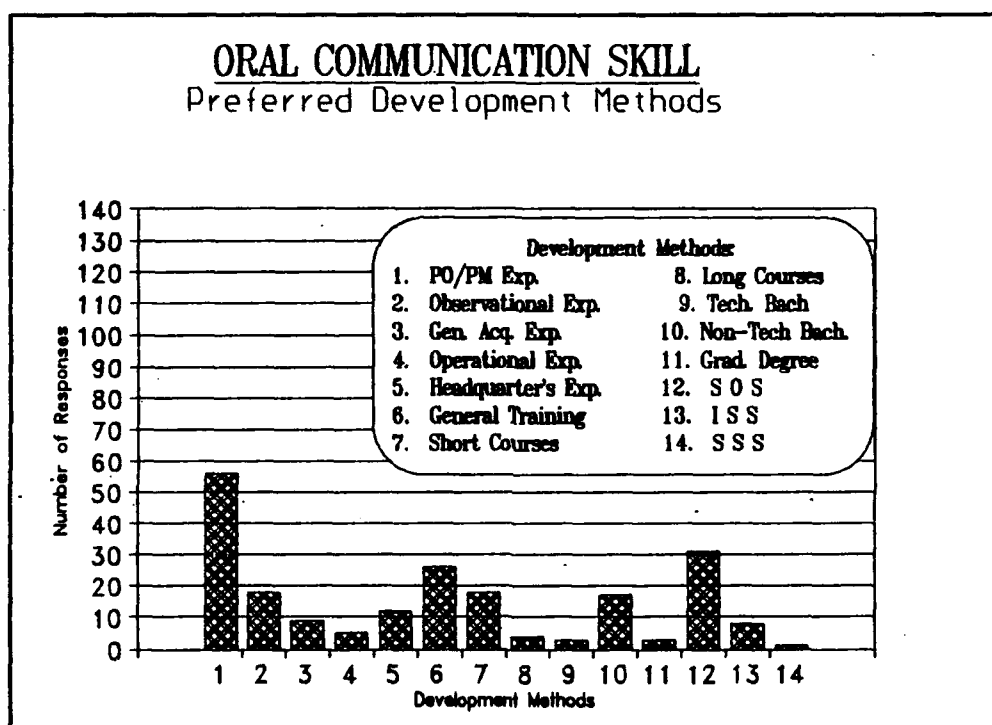


Figure 13 - Oral Communication Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (27%), 2) SOS (15%), and 3) Headquarters Experience (12%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Oral Communication skill.

Hypothesis 4G. There is no consensus of preferred development method(s) for the Organizational Politics skill. The histogram of the preferred development methods is presented in the figure below.

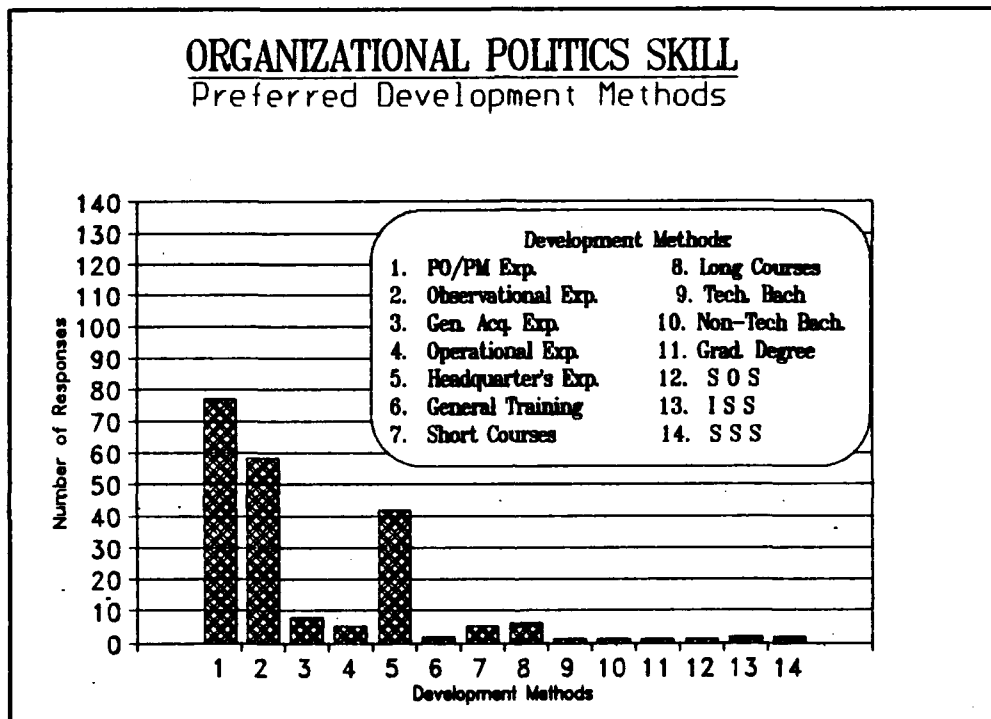


Figure 14 - Organizational Politics Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (36%), 2) Observational Experience (28%), and Headquarters Experience (20%). The hypothesis is **REJECTED**: There is A **CONSENSUS** of preferred development methods for the Organizational Politics skill.

Hypothesis 4H. There is no consensus of preferred development method(s) for the Planning skill. The histogram of the preferred development methods is presented in the figure below.

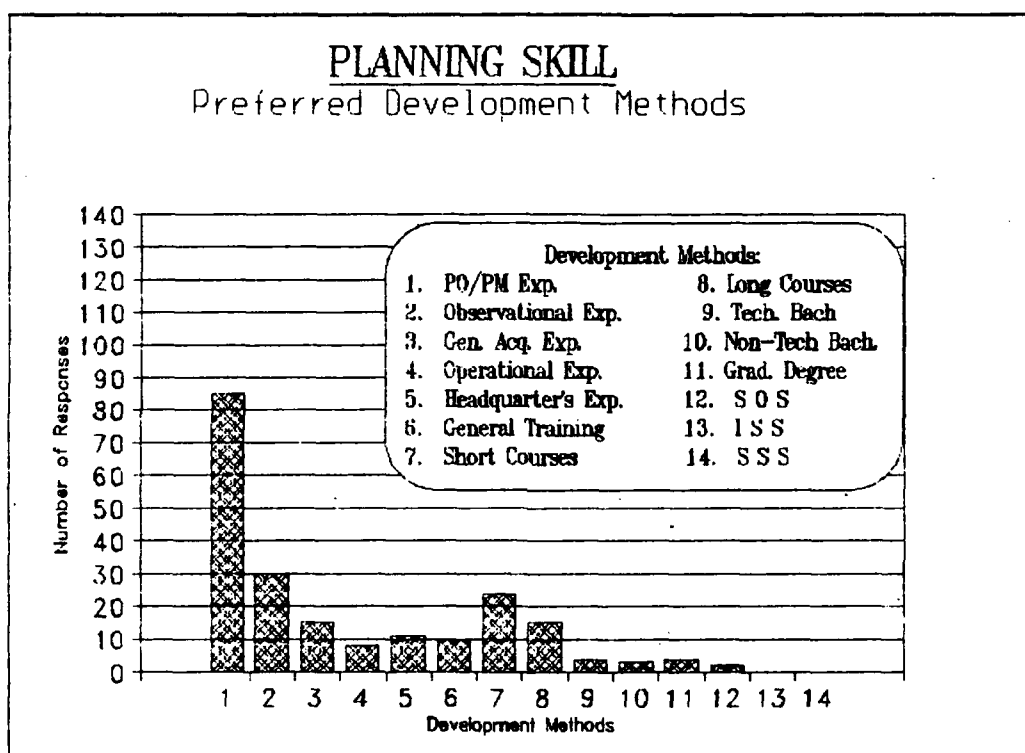


Figure 15 - Planning Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (40%), 2) Observational Experience (14%), and 3) Short Courses (11%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Planning skill.

Hypothesis 4I. There is no consensus of preferred development method(s) for the Project Organization skill. The histogram of the preferred development methods is presented in the figure below.

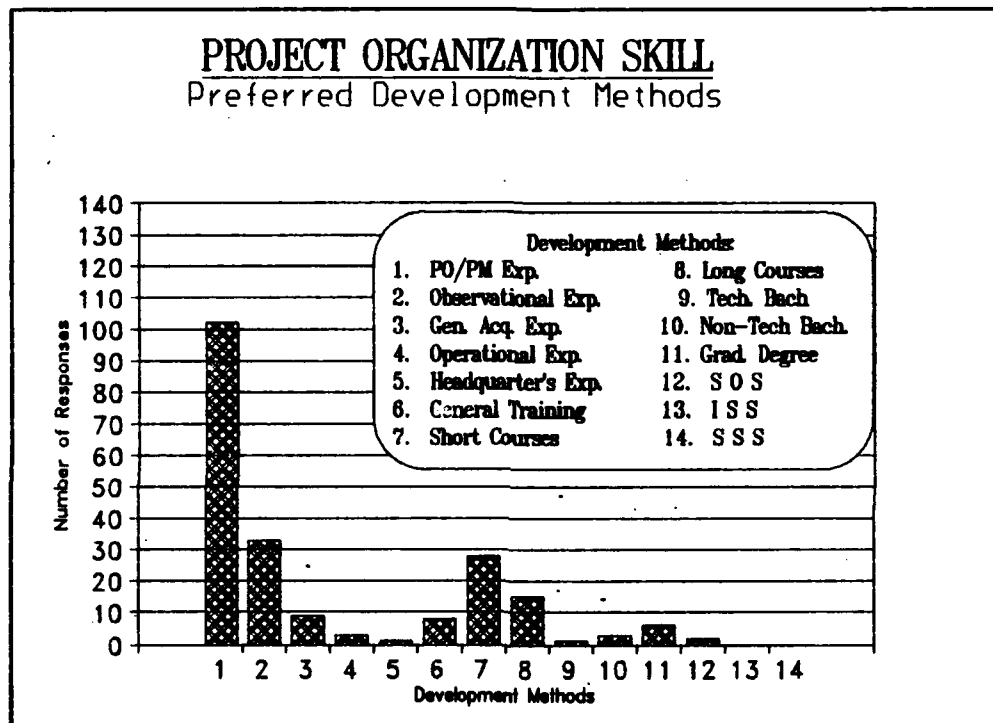


Figure 16 - Project Organization Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (48%), 2) Observational Experience (16%), and 3) Short Courses (13%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Project Organization skill.

Hypothesis 4J. There is no consensus of preferred development method(s) for the Resource Allocation skill. The histogram of the preferred development methods is presented in the figure below.

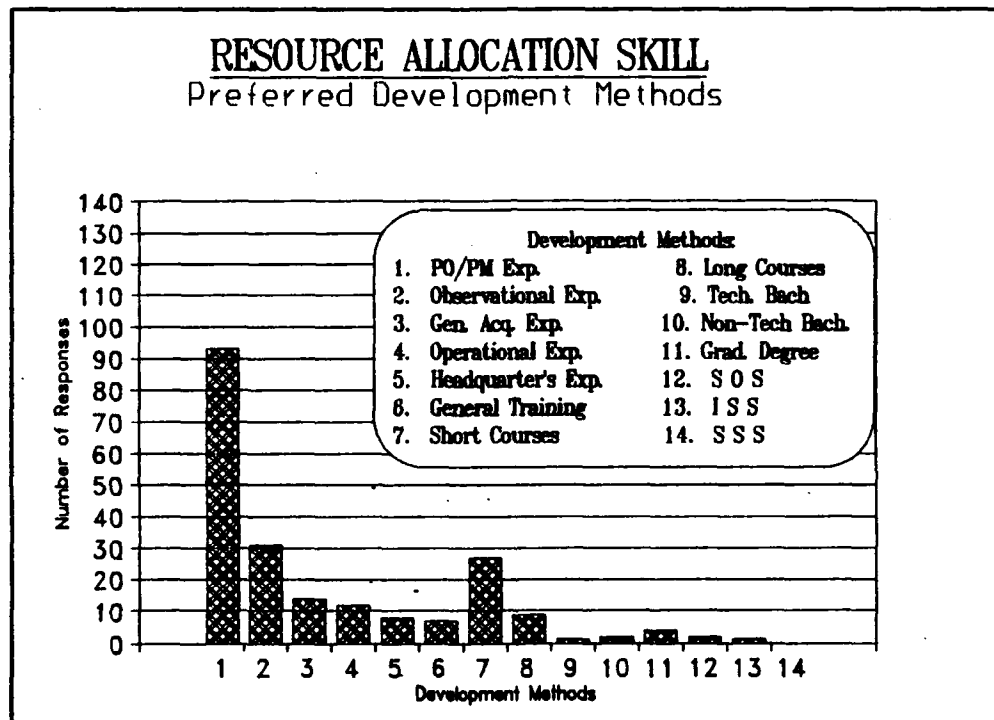


Figure 17 - Resource Allocation Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (44%), 2) Observational Experience (15%), and 3) Short Courses (13%). The hypothesis is **REJECTED**: There is A **CONSENSUS** of preferred development methods for the Resource Allocation skill.

Hypothesis 4K. There is no consensus of preferred development method(s) for the Stress/Conflict Management skill. The histogram of the preferred development methods is presented in the figure below.

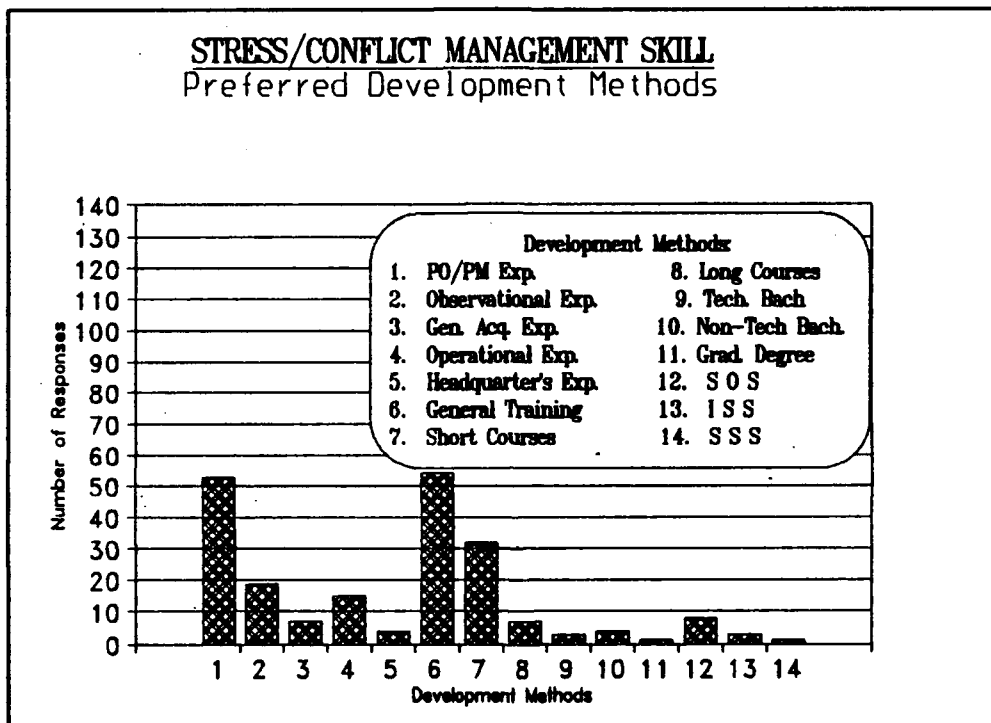


Figure 18 - Stress/Conflict Management Skill Preferred Development Methods

The three most selected development methods were: 1) General Training (26%), 2) PO/PM Experience (25%), and 3) Short Courses (15%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Stress/Conflict Management skill.

Hypothesis 4L. There is no consensus of preferred development method(s) for the Team-Building skill. The histogram of the preferred development methods is presented in the figure below.

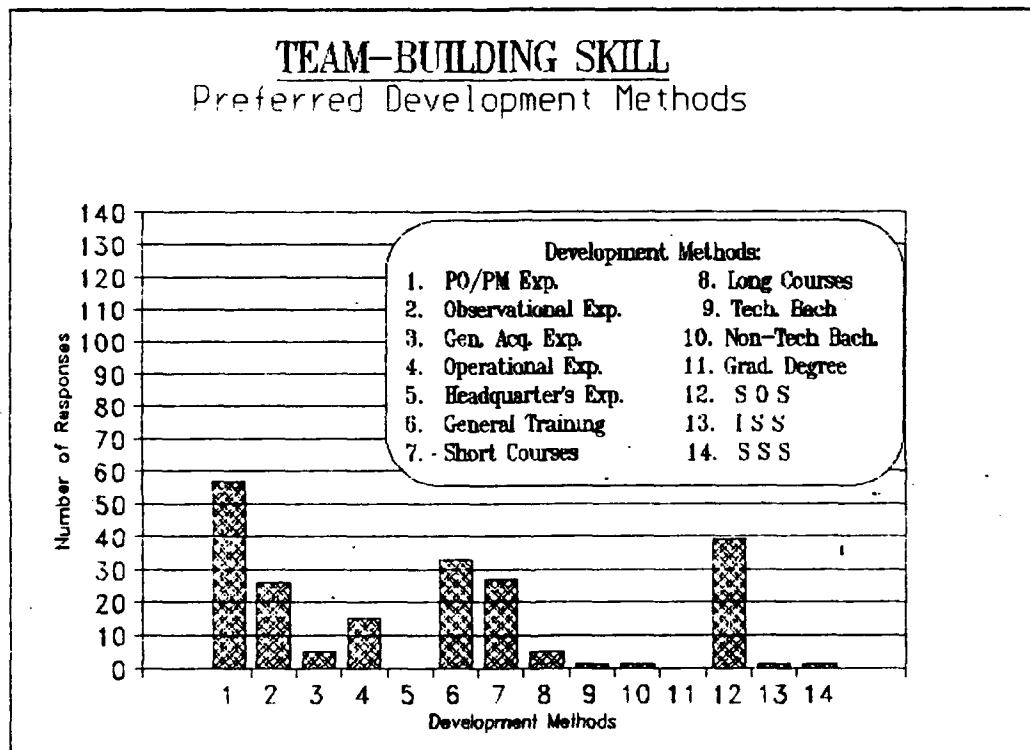


Figure 19 - Team-Building Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (27%), 2) SOS (19%), and 3) General Training (16%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Team-Building skill.

Hypothesis 4M. There is no consensus of preferred development method(s) for the Technical skill. The histogram of the preferred development methods is presented in the figure below.

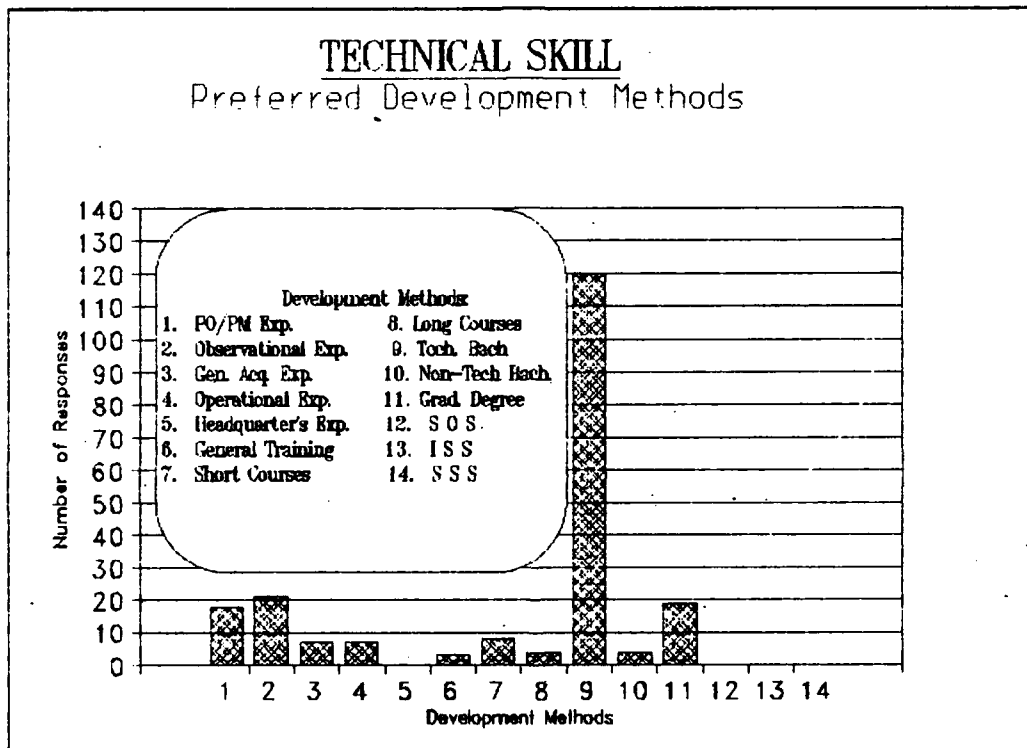


Figure 20 - Technical Skill Preferred Development Methods

The three most selected development methods were: 1) Technical Bachelor's Degree (57%), 2) Observational Experience (10%), and 3) Graduate Degree (9%). The hypothesis is REJECTED: There is A CONSENSUS of preferred development methods for the Technical skill.

Hypothesis 4N. There is no consensus of preferred development method(s) for the Written Communication skill. The histogram of the preferred development methods is presented in the figure below.

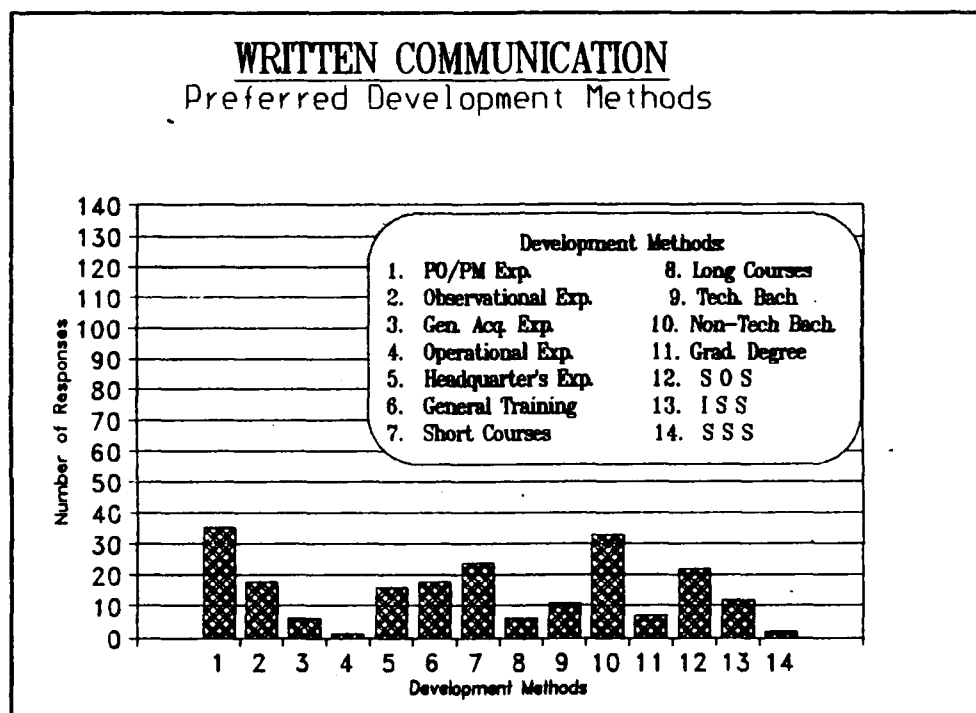


Figure 21 - Written Communication Skill Preferred Development Methods

The three most selected development methods were: 1) PO/PM Experience (17%), 2) Non-Technical Bachelor's Degree (17%), and 3) Short Courses (11%). The hypothesis is ACCEPTED: There is NOT A CONSENSUS of preferred development methods for the Written Communication skill.

Research Objective 4 Hypotheses Summary. A summary of all 14 hypotheses is provided in the table below.

TABLE 23

Summary of Preferred Development Methods

SKILL	1st Most Preferred Method	2nd Most Preferred Method	3rd Most Preferred Method
CONTROLLING	PO/PM Exp. (64%)	Observational Exp. (14%)	Short Courses (7%)
DECISION MAKING	PO/PM Exp. (56 %)	Observational Exp. (12%)	Operational Exp. (12 %)
INFORMATION PROCESSING	PO/PM Exp. (28 %)	Tech. Bach. Degree (18%)	Observational Exp. (15%)
LEADERSHIP	PO/PM Exp. (40 %)	SOS (21%)	Operational Exp. (19%)
MOTIVATION	PO/PM Exp. (32 %)	SOS (16%)	Operational Exp. (13%)
ORAL COMMUNICATION	PO/PM Exp. (27 %)	SOS (15 %)	Headquarters Exp. (12%)
ORGANIZATIONAL POLITICS	PO/PM Exp. (36 %)	Observational Exp. (28 %)	Headquarters Exp. (20 %)
PLANNING	PO/PM Exp. (40 %)	Observational Exp. (14 %)	Short Courses (11 %)
PROJECT ORGANIZATION	PO/PM Exp. (48 %)	Observational Exp. (16%)	Short Courses (13%)
RESOURCE ALLOCATION	PO/PM Exp. (44 %)	Observational Exp. (15%)	Short Courses (13%)
STRESS/CONFLICT MANAGEMENT	Gen. Trn. (26 %)	PO/PM Exp. (25%)	Short Courses (15%)
TEAM-BUILDING	PO/PM Exp. (27 %)	SOS (19%)	Gen. Trn. (16%)
TECHNICAL	Tech. Bach. Degree (57%)	Observational Exp. (10%)	Grad. Degree (9%)
WRITTEN COMMUNICATION	PO/PM Exp. (17 %)	Non-Tech. Bach Degree (17%)	Short Courses (11%)

Respondent Comments

In addition to the comments concerning skills or development methods, there were many lengthy, and well described comments in the topic area of acquisition manager career development. The Acquisition Professional Development Program (APDP) was the focus. These comments were the most passionate. Several were "unconstructive" to say the least, and "offensive" to say the most. Many were however, quite useful.

The majority felt that the predecessor of APDP was greatly needed and introduced structure to the Air Force Officer management field. APDP, it was felt, was the next logical step since it introduced similar career certification levels for other disciplines (acquisition logistics, etc.) and ties key management positions to certification levels. There were, naturally, two areas that the respondents felt APDP needed improvement.

First, the most widely mentioned criticism of APDP was that it de-emphasized quality experience by requiring only durations in experience "slots" and too many training and education "squares" to be filled. Certification (and thus key positions) based only on having "squares" filled without meaningful experience was a major fear. The perception of having many "squares" to fill also elicited the comment that in order to fill them all, a person must transition between jobs and courses so often that he/she can't learn from his/her mistakes (or successes) because he/she is not

around. This comment is in complete agreement with the overwhelming consensus that the best way to develop a skill is by experience (after being introduced to it first).

The second criticism was that ADPD thrusts untrained Second Lieutenants (and Majors right out of operations) into the acquisition management environment without introductory training. The theme "we train our pilots well, why not our program managers" was predominant. This criticism is addressed in commercial management as well.

In light of manager's assertions that training is valuable not only because of the subject matter but because of the interactive environment and the relationships formed with other participants, it may be that training should be required of new managers within the first three months on the job (Zemke, 1985:51).

Currently, an introductory acquisition training course is being developed for the Air Force.

Although there were some constructive criticisms, most respondents indicated positive support of the APDP. The success of the Air Force management career development is known elsewhere.

The Air Force is generally recognized as having the best record of the three services for acquisition training and career development (Fox, 1988:207).

The wealth of comments showed a true interest by Air Force managers in their career development. These comments will be used in Chapter 5 when drawing conclusions.

V. Conclusions and Recommendations

Introduction

The purpose of this chapter is to interpret the data, stating the implications of the analysis. This chapter will be divided into four main sections: study overview, summary of results, conclusions, and recommendations.

Study Overview

The purpose of this study was to analyze the association between the perceived importance of management skills and management level; also to assess the most effective means of developing each of those management skills. The study focuses on non-rated Air Force officers. Data collection involved a two step process. First, a literature search was conducted to compile a list of common management skills and development methods. Second, from this knowledge a survey instrument (requesting respondents to: rank skill importance, select preferred development methods, and provide qualitative comments) was created and distributed. The three basic methodologies used to analyze the data were: 1) non-parametric statistics, 2) frequency distribution analysis, and 3) qualitative analysis.

Summary of Results

The data analyses indicated some profound results. Although the response rate was lower than expected, the

sample was deemed representative of the population. The background analyses indicated high levels of Project Officer (PO)/Program Manager (PM) experience, and to a lesser extent Operational experience. Generally, the respondent's had little training background, however, the Program Directors, Group 3, (duty Air Force Speciality Code (AFSC) 0029), exhibited the highest level of training. Overall, most the respondents had a technical bachelor's degree and some type of graduate degree. Due to the highly encouraged nature of Professional Military Education (PME), the percentage of respondents completing PME (corresponding to their eligibility) was nearly 100 percent in all cases.

These findings will become more relevant when other results are summarized and when conclusions are drawn. A more thorough analysis of response rate and sample background can be found in the Preliminary Analysis section of Chapter 4. The summary of results will be further partitioned into three key areas: Skills, Methods, and Career Development.

Skills. 11 of the 14 skills tested had a significant association between perceived skill importance and at least two management levels. The average perceived importance differed between the groups, hence each group had a different ranking of skills (most important (1) to least important (14)). Also, the qualitative analysis resulted in the addition of four skills excluded originally. This information is concisely presented in the table below.

TABLE 24

Summary of Results: Management Skills

SKILLS	Association With Which Groups*	Group 1 Ranking	Group 2 Ranking	Group 3 Ranking
Controlling	ALL	6	4	4
Decision Making	ALL	1	1	1
Information Processing	1 & 2	3	2	5
Leadership	ALL	5	3	2
Motivation	ALL	12	7	7
Oral Communication	2 & 3	2	5	3
Organizational Politics	ALL	9	11	8
Planning	NONE	4	6	11
Project Organization	NONE	7	12	14
Resource Allocation	ALL	11	9	9
Stress/Conflict Management	ALL	13	13	12
Team-Building	ALL	10	8	6
Technical	NONE	14	14	13
Written Communication	2 & 3	8	10	10
Added Skills	N/A	N/A	N/A	N/A
Personnel Mgt Time Mgt Delegation Computer Literacy	N/A	N/A	N/A	N/A

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

Ranking: 1 = highest average importance, 14 = lowest

N/A - Since Added Skills not originally in survey instrument

The most profound finding was not even an intended research area of study. Based upon the literature review, it was fully anticipated to have negative associations (R_s values) as well as positive associations. More simply, some skills should have decreased in importance while some should have increased in importance. Unexpectedly, however, all the skills (with significant associations) increased in importance (positive R_s values). There was no substitution of skills as the managers progressed in level. This implies that the dimensions of the Management Skills Mix (Badawy, 1982:21) should not be rectangular (overall number of skills needed is constant at every management level), but more accurately should have been a triangle. Although this implication was discovered using a sample of the Air Force manager population, it seems logical that this "more accurate" diagram applies to the commercial world as well. The two figures presented below illustrate this point.

Finally, the qualitative comments concerning timing of skills needs based on management level were informative. The comments repeatedly given can be stated in three broad themes. First, managers transition from individualistic, low responsibility tasks to team oriented high responsibility tasks. This is in complete agreement with the findings that all significantly associated skills increase in importance. Second, how skills are used change. For example decision making at lower management levels is based on nearly complete information, whereas, decisions

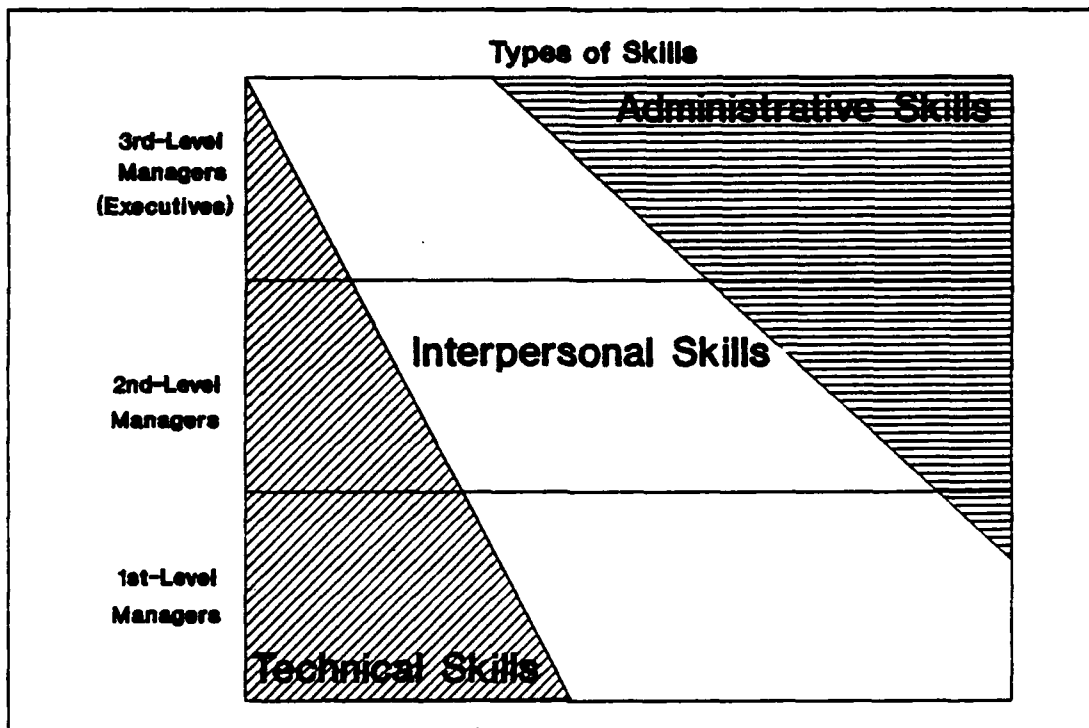


Figure 22 - Original Management Skills Mix
(Badawy, 1982:21)

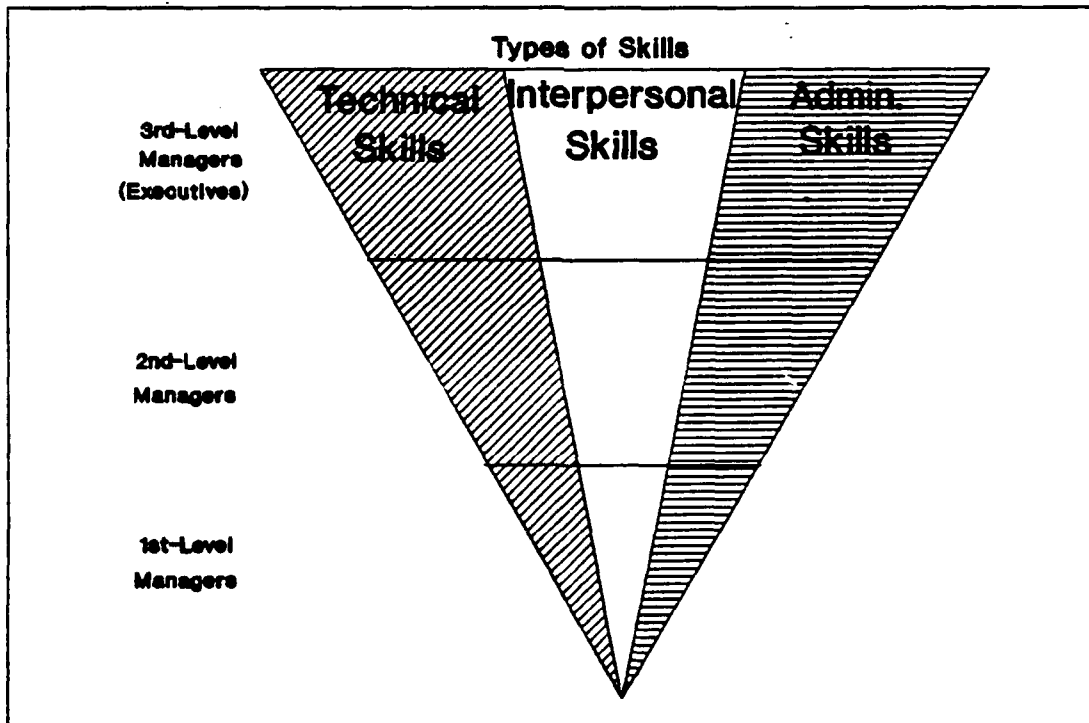


Figure 23 - Modified Management Skills Mix

made at higher management levels is often based on incomplete information. Note that the Decision Making skill was ranked most important by all three groups, yet the skill itself is used differently by each management level. The third broad theme was that certain personal attributes are essential to competent management. All the skills in the world won't help a manager who lacks common sense. A more thorough analysis of Skills can be found in the Research Objective 1 and 2 Analyses sections of Chapter 4.

Methods. The frequency distribution analyses indicated there was a consensus (selection of a development method by 25% or more of the respondents) of preferred development method(s) for 13 out of the 14 skills. The predominantly preferred method was PO/PM experience. This is mitigated, however, by the repeatedly given qualitative comment that the "best" way to develop any skill is to first be exposed to it (formally or observation), and then to actually experience it. This comment is key in later conclusions. The qualitative analysis also resulted in the addition of three development methods that the respondents indicated were "missing" from the survey. This information is concisely presented in the table below. The predominance of PO/PM experience, and virtual non-existence of training (in any form) may be due to the respondents' backgrounds previously summarized. A more thorough analysis of Methods can be found in the Research Objective 3 and 4 Analyses sections of Chapter 4.

TABLE 25

Summary of Results: Development Methods

Development Methods	Number of times within Top 3 Preferred Methods
PO/PM Experience	13
Observational Experience	8
General Acquisition Experience	0
Operational Experience	4
Headquarters Experience	2
General Training	2
Short Courses	5
Long Courses	0
Technical Bachelor's Degree	2
Non-Technical Bachelor's Degree	1
Graduate Degree	1
Squadron Officer School (SOS)	4
Intermediate Service School (ISS)	0
Senior Service School (SSS)	0
Added Development Methods	N/A
Mentorship Apprenticeship Feedback/Counseling Outside Activities (pre-USAF and extracurricular)	N/A

N/A - Since Added Methods not originally in survey

Career Development. The majority of respondents indicated that the Program Management Professional Development (PMPD) portion of the Acquisition Professional Development Program (APDP) was greatly needed and provides structure to the Air Force Officer management career

development. The respondents did, however, repeatedly mentioned two areas needing improvement. These two areas are important since they will be used later to draw conclusions and make recommendations.

First, the most widely mentioned criticism of PMPD was that it over-emphasized training "squares", and thereby de-emphasized experience. The overall high level of experience and low level of training exhibited by the respondents' backgrounds probably precipitated this comment. Also, this completely agrees with the overwhelming consensus (both qualitatively and quantitatively) that the best way to develop skills is by experience.

Second, there is a need for some type of introductory training for both new Second Lieutenants and operators newly transitioned into acquisition.

Conclusions

The next logical step is to draw conclusions from the interpreted results. To interpret the results, the most important skills and their most preferred development methods will be integrated. Predominant development methods (based on skills needs) will then be apparent. Naturally, the qualitative comments will also be integrated into the interpretation. This integration will be accomplished separately for each of the three groups resulting in three "mini" career paths. Finally, the three "mini" career paths

will be joined into a single "ideal career path." This "ideal career path" will be presented graphically.

Group 1 Integration. The skills most important to Group 1, Acquisition Project Officers (duty AFSC 2721/2724), and the preferred development methods for those skills are presented in the table below.

TABLE 26

Integrated Skills and Methods: Group 1

7 Most Important Skills	Assoc. With Which Groups*	1st Most Preferred Method	2nd Most Preferred Method	3rd Most Preferred Method
Decision Making	ALL	PO/PM Ex.	Obs. Exp.	Oper. Ex.
Oral Communication	2 & 3	PO/PM Ex.	SOS	HQ Exp.
Information Processing	1 & 2	PO/PM Ex.	Technical Bachelors	Obs. Exp.
Planning	NONE	PO/PM Ex.	Obs. Exp.	Short Cs.
Leadership	ALL	PO/PM Ex.	SOS	Oper. Ex.
Controlling	ALL	PO/PM Ex.	Obs. Exp.	Short Cs.
Project Organization	NONE	PO/PM Ex.	Obs. Exp.	Short Cs.

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

A review of the table above, the 1st Most Preferred Method column in particular, strongly suggests PO/PM experience as the apparent "best" development method for Group 1 individuals. However, two key qualitative results previously stated suggest otherwise. First, the suggested

"best" way to learn was to be exposed to a skill, then to experience it. This requires a review of the 2nd Most Preferred Method column, suggesting a mix of Observational experience, SOS, and a Technical Bachelor's. The large percentage of respondents' having Technical Bachelor's degrees suggests this as a prerequisite requirement for Group 1 managers. The newly graduated Second Lieutenant Group 1 manager entering the Air Force acquisition management field should first attend an introductory acquisition course (also suggested previously). The results emphasized experience. This, plus due to his/her ineligibility to SOS, Observational experience should be the Group 1 manager's first assignment. Short courses should be taken intermittently during this assignment. After completion of the first assignment, and now eligible, SOS should be completed. Reviewing the 3rd Most Preferred Method column introduces the two remaining development methods: Operational experience, and Headquarters experience. The Headquarters experience develops the Oral Communication skill, which according to the table, is more highly associated between Group level 2 and 3. This experience can be deferred. Thus, a career-broadening operational assignment should be next. Upon completion, the Group 1 manager is qualified for PMPD certification level 1 in accordance with Air Force Regulation (AFR) 36-27, Acquisition Professional Development Program. Certified for level 1, but still not eligible for Group level 2 (must be a

Major), a PO/PM experience should be the next assignment. Being the first PO/PM experience a small project, or apprenticeship to a major sub-system program is recommended. After completion of this assignment, a graduate degree should be completed (recommend full time through the Air Force Institute of Technology). Although the data did not indicate the benefits of a graduate degree for skills' development, PMPD certification (level II) and promotion statistics highly encourage completion of a graduate degree. The manager is now eligible for Group 2.

Group 2 Integration. The skills most important to Group 2, Acquisition Management Officers (duty AFSC 2711/2716), and the preferred development methods for those skills are presented in the table below.

TABLE 27
Integrated Skills and Methods: Group 2

7 Most Important Skills	Assoc. With Which Groups*	1st Most Preferred Method	2nd Most Preferred Method	3rd Most Preferred Method
Decision Making	ALL	PO/PM Ex.	Obs. Exp.	Oper. Ex.
Information Processing	1 & 2	PO/PM Ex.	Technical Bachelors	Obs. Exp.
Leadership	ALL	PO/PM Ex.	SOS	Oper. Ex.
Controlling	ALL	PO/PM Ex.	Obs. Exp.	Short Cs.
Oral Communication	2 & 3	PO/PM Ex.	SOS	HQ Exp.
Planning	NONE	PO/PM Ex.	Obs. Exp.	Short Cs.
Motivation	ALL	PO/PM Ex.	SOS	Oper. Ex.

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

A review of the table above, the 1st Most Preferred Method column in particular, strongly suggests (again), PO/PM experience. In preparation for Group 3, the need to develop the Oral Communication skill (previously deferred) can be met with a Headquarters experience assignment. Again, Short courses should be taken intermittently. This Group level 2 manager is now eligible for level II certification. Having completed all the types of development methods on the table above, PO/PM experience should be the next assignment. This time, however, the manager is fully qualified to lead the major sub-system program. The Defense Systems Management College (DSMC) Program Management Course (PMC) and Intermediate Service School (ISS) should both be completed sometime at the Group 2 level. Again, the data did not indicate the benefits of Long Courses (DSMC is a Long Course) or ISS to skills' development. Certification level III, and promotion statistics (for ISS at least), however, highly encourage completion of both. The Group 2 manager is now eligible for certification level III and entry into Group 3. For promotional reasons, Senior Service School (SSS) should be completed at the end of Group level 2 and just prior to entry into Group 3.

Group 3 Integration. The skills most important to Group 3, Program Directors (duty AFSC 0029), and the preferred development methods for those skills are presented in the table below.

TABLE 28

Integrated Skills and Methods: Group 3

7 Most Important Skills	Assoc. With Which Groups*	1st Most Preferred Method	2nd Most Preferred Method	3rd Most Preferred Method
Decision Making	ALL	PO/PM Ex.	Obs. Exp.	Oper. Ex.
Leadership	ALL	PO/PM Ex.	SOS	Oper. Ex.
Oral Communication	2 & 3	PO/PM Ex.	SOS	HQ Exp.
Controlling	ALL	PO/PM Ex.	Obs. Exp.	Short Cs.
Information Processing	1 & 2	PO/PM Ex.	Technical Bachelors	Obs. Exp.
Team-Building	ALL	PO/PM Ex.	SOS	Gen. Trn.
Motivation	ALL	PO/PM Ex.	SOS	Oper. Ex.

* Statistically significant ($\alpha = 0.1$ level, (2 tail test))

The new manager is fully qualified to be a Program Director (duty AFSC 0029), however, as an entry level Group 3 manager, a deputy Program Director assignment is recommended initially. Follow on assignments should include Program Director assignments. The only additional development method introduced in the table above is General Training. General Training can be taken intermittently with the manager's first assignment.

Ideal Career Path. The "Ideal Career Path" for a professional Air Force acquisition manager can be constructed by joining the three "mini" career paths previously described for each group. This career path is

presented graphically in the figure below. Although the figure is based upon the results of this study and is an original creation, the graphical nature and some key elements are attributable to two sources (AFR 36-27, 1990; Fox, 1988:210).

Rank	YEARS	Cert. Level	<u>Assignments</u>	<u>Other</u>
LT	2		Introductory Course	
CAPT	4		Observational Experience	Short Courses
	6	I	Operational Experience	SOS
	10		PO/PM Experience	
MAJOR	12		AFIT GRAD DEGREE	
	14	II	HQ Experience	Short Courses
	16			DSMC
LTC	18		PO/PM Experience	
	20	III		SSS
	22		Deputy Program Director	Gen. Training
COL			Program Director	

Figure 24 - Ideal Career Path for Air Force Acquisition Managers

Recommendations

The recommendations are based upon the conclusions and topics discovered in the research process. Recommendations will be made in two categories: suggested refinements to the PMPD, and suggestions for further research.

Suggested Refinements to the PMPD. The analysis and conclusions indicate the PMPD is fundamentally sound. The majority of respondent comments and at least one outside source recognize the PMPD as the best acquisition management career development program in existence. An individual pursuing the PMPD certification requirements will develop the skills needed for Air Force acquisition management. Due to the timing of skills needs, however, this pursuit may not be the most effective or efficient career development path. Based upon the conclusions of this study, four recommendations for PMPD refinement are suggested:

- 1) Consider including a recommended but non-binding "Suggested" career path. The career path presented above (or one similar to it), if followed could provide the development method(s) best suited to develop the management skills needed when they are needed.
- 2) Require and provide introductory acquisition training to any manager entering the acquisition profession.
- 3) Consider de-emphasizing "square-filling" only training. Training in conjunction with experience is perceived as most useful in developing skills.

4) Consider re-emphasizing "meaningful" experience.

Develop a system that distinguishes and credits experiences (acquisition experience and career broadening experience) useful to career development (as described in the Conclusions section of this chapter).

Suggestions for Further Research. During the course of this study, several interesting and needy topic areas were noted as potential areas for future research. Four key topics are recommended:

- 1) Further explore the unexpected finding presented in Figure 23. Does the importance of all skills increase with management level (no substitution of skills) in commercial industry as well?
- 2) Perform a more rigorous study of the development methods. Include the additional development methods identified in Table 25.
- 3) Extend the skill's importance study to other populations and compare to these for validation. Include the additional skills identified in Table 24.
- 4) Validate the theory of the benefit of a technical bachelor's degree, followed by management experience, then followed by a management graduate degree.

Of course, any of these recommended studies, or a repeat of this study, could be conducted on civilian Air Force personnel, other services within the Department of Defense (civilian or military), or managers in commercial industry.

Final Remarks

It is hoped that the findings of this research effort will provide useful information to those who influence acquisition career development. If it stimulates others to further study areas relating to acquisition career development, then it will have been worthwhile. Ultimately, it is hoped that these findings will result in better Air Force program managers.

Clearly, the key to developing highly skilled program managers lies, as it does in industry, in the development of a stable acquisition career path (Fox, 1988:196).

Appendix A: Test Instrument and AFMPC Approval Letter



OFFICE OF THE ASSISTANT SECRETARY

DEPARTMENT OF THE AIR FORCE
WASHINGTON DC 20330-1000

MAY 16 1991

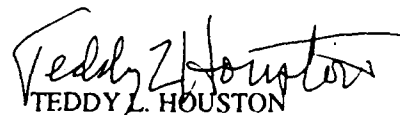
MEMORANDUM FOR AIR FORCE SPECIALTY CODE (AFSC) 27XX AND 0029
PERSONNEL

SUBJECT: Survey on Acquisition Manager Skills Development - ACTION
MEMORANDUM

I am sponsoring a study by Captain Seb DeLiso, an AFIT graduate student, on acquisition manager skill development. As part of the study, Seb has prepared a survey to help him collect data for analysis, and we both request that you take a few minutes of your time to complete and return it to AFTT/LSG in the enclosed envelope (within 10 working days, please). Your responses will be anonymous, so please do not sign or put your social security number on the survey. When the study is published, readers will not be able to identify specific individuals. Should you decide not to participate, we do ask that you pass the survey to a colleague who did not receive a survey.

The results of the study will be presented in terms of group averages to determine the perceptions of the typical 27XX or 0029 officer. I believe the study results will be an important source of information for us to use in refining the professional development of program managers and directors. The study will help us better understand education, training and experience requirements relevant to the Air Force Acquisition Professional Development Program (AFR 36-27), which will implement the Defense Acquisition Work Force Improvement Act of 1990.

Your participation is voluntary; however, we do hope you will take advantage of this opportunity to provide your input to the process. Should you have questions, please contact Captain Seb DeLiso, DSN 785-8988. He will be glad to help you.


TEDDY L. HOUSTON

Acting Director of Acquisition
Career Management
Assistant Secretary (Acquisition)

- 3 Atch
1. Survey
2. Computer Form
3. Return Envelope

PROGRAM MANAGEMENT SKILLS
AND
SKILLS DEVELOPMENT METHODS

Overview

The purpose of this survey is three-fold: 1) to measure the importance of management skills needed by program managers, 2) to measure the preferred methods to develop these needed management skills, and 3) to analyze those two measurements to assess program manager career development. This survey consists of 5 major sections: 1) Prerequisite Information, 2) Management Skills Ranking, 3) Preferred Development Methods, 4) Background Information, and 5) Expert Comments. The shared personal experiences by an expert (YOU) can provide valuable insights into program manager development and ultimately may lead to improved career development of the skills needed, when they are needed.

Instructions

Answer all items by circling the appropriate response to each question and by darkening the appropriate circle on the computer form provided. Please answer each item as honestly and frankly as possible. Participation is voluntary. To ensure your response remains anonymous, please do not sign your name, or include your social security number on this survey or answer sheet.

Section I - Prerequisite Information: (Questions 1 - 4)

1. From the list below, select your current duty AFSC:

- A. 2721
- B. 2724
- C. 2711
- D. 2716
- E. 0029
- F. None of the above: STOP! Please pass this survey to someone in your office who has an AFSC identified above.

2. From the list below, select your current Military Rank:

- A. Second Lieutenant
- B. First Lieutenant
- C. Captain
- D. Major
- E. Lieutenant Colonel
- F. Colonel

3. How much Total Active Federal Commissioned Service do you have?

- | | |
|----------------------------|----------------------------|
| A. Between 0 and 2 years | G. Between 12 and 14 years |
| B. Between 2 and 4 years | H. Between 14 and 16 years |
| C. Between 4 and 6 years | I. Between 16 and 18 years |
| D. Between 6 and 8 years | J. Between 18 and 20 years |
| E. Between 8 and 10 years | K. Greater than 20 years |
| F. Between 10 and 12 years | |

4. From the list below, select your present organization:

- | | |
|------------|----------------------------|
| A. AFSC HQ | F. MSD |
| B. ASD | G. SSD |
| C. BSD | H. Other AFSC Organization |
| D. ESD | I. None of the above |
| E. HSD | |

Section II - Management Skills Ranking: (Questions 5 - 18)

The purpose of this section is to assess the importance of 14 management skills. Extensive research has found these skills to be the predominant skills used by program managers in commercial and government organizations.

Consider the challenges and activities of your current job. Using the scale below, rank the importance of the 14 management skills. Do not assess your own capabilities; assess the value of the skill in performing your job regardless whether you are a master or novice at that skill.

For each skill assign one of these five importance "levels":

- | | |
|------------------|---|
| A. Indispensable | Must have the skill to perform the job. |
| B. Significant | Need the skill to do competent work. |
| C. Useful | The skill noticeably contributes to the job. |
| D. Limited | Skill has slight benefits to job performance. |
| E. Negligible | No obvious gain due to the skill. |

- | | |
|---|--|
| 5. Controlling
A B C D E | The ability to pro-actively assure maintenance of and adjustment to the project resources, plans, schedule, and budget, in the continuous evaluation of the achievement of project goals. |
| 6. Decision Making
A B C D E | The ability to define, evaluate, and select (or recommend) alternatives weighing all pertinent project priorities. |
| 7. Information Processing
A B C D E | The ability to read and/or listen to data and then discern relevant information. |
| 8. Leadership
A B C D E | The ability to provide direction, vision, goals, and inspiration to the group. |
| 9. Motivation
A B C D E | The ability to provide incentives and an environment conducive to getting the most out of each individual on the project team. |
| 10. Oral Communication
A B C D E | The ability to converse with, brief, and listen to supervisors, subordinates, and peers. |
| 11. Organizational Politics
A B C D E | The ability to understand how the organization works and how to work with the organization. Includes both internal and external diplomacy needed to compete for and secure additional resources. |
| 12. Planning
A B C D E | The ability to create and revise the project strategy defining what, who, when, and how the project goals will be accomplished. Includes project schedules and budget programming. |
| 13. Project Organization
A B C D E | The ability to divide the overall project into component tasks and structure them to achieve project goals. Includes the ability to arrange key events like meetings or reviews. |
| 14. Resource Allocation
A B C D E | The ability to implement trade-off decisions and assign the existing resources accordingly. |
| 15. Stress/Conflict Management
A B C D E | The ability to anticipate, react to, and introduce, conflict to further project goals. |
| 16. Team-Building
A B C D E | The ability to identify, acquire, and integrate functional members into a single project team. |
| 17. Technical
A B C D E | The ability to understand, converse in, evaluate, and balance the technical concepts, applications, and trends of the project. |
| 18. Written Communication
A B C D E | The ability to create, revise, and review documents to/from supervisors, subordinates, and peers. |

Section III - Preferred Development Methods: (Questions 19 - 32)

The purpose of this section is to assess the preference of 14 development methods. Research has found these development methods to be the predominant ones used to develop program managers in government organisations. The development methods below have been grouped into four categories: Experience, Training, Education, and Professional Military Education (PME).

EXPERIENCE:

A. Project Officer (PO)/Program Manager (PM) Experience - an assignment where a person is responsible for cost, schedule, performance, reliability, and maintainability of a system or sub-system being developed, modified, or produced by a program office or similar organization.

B. Observational Experience - an assignment where a person works for or in support of a PO/PM in a functional role (such as engineering, configuration, logistics, contracting, program control, etc.).

C. General Acquisition Experience - assignments in support of acquisition but not in a program office (such as a test organization, laboratory, Contract Administrative Services organization, etc.).

D. Operational Experience - any assignment that gives the incumbent a first hand experience of operational user mission functions (includes aircrew, missile launch officers, maintenance, munitions, etc.).

E. Headquarters Experience - any acquisition-related assignment at a HQ.

TRAINING:

F. General Training - Seminars, Workshops, Symposiums, or Instructional Briefings.

G. Short Courses - courses lasting less than 1 month intended to teach specific skills (such as SYS 100, 200, 400 or PCE specialty courses).

H. Long Courses - courses longer than 1 month intended to develop broad skills and concepts (such as DSMC PMC or single courses taken at a university not in pursuit of a degree).

EDUCATION:

I. Technical Bachelor's Degree - accredited bachelor's degree in science, engineering, or computers.

J. Non-Technical Bachelor's Degree - accredited bachelor's degree in disciplines other than science, engineering, or computers.

K. Graduate Degree - accredited Master's or Doctorate degree in any area.

PME:

L. Squadron Officer's School - any method (residence, correspondence, etc.).

M. Intermediate Service School - or equivalent, any method.

N. Senior Service School - or equivalent, any method.

Consider your own experience or what you have heard about the methods listed above. For each skill listed below, assign a single preferred development method which you believe best develops that skill. You may repeat the same method(s) for several skills. Refer to previous page for skills definitions if necessary.

	<u>Experience</u>	<u>Training</u>	<u>Education</u>	<u>PME</u>
19. Controlling	A B C D E	F G H	I J K	L M N
20. Decision Making	A B C D E	F G H	I J K	L M N
21. Information Processing	A B C D E	F G H	I J K	L M N
22. Leadership	A B C D E	F G H	I J K	L M N
23. Motivation	A B C D E	F G H	I J K	L M N
24. Oral Communication	A B C D E	F G H	I J K	L M N
25. Organisational Politics	A B C D E	F G H	I J K	L M N
26. Planning	A B C D E	F G H	I J K	L M N
27. Project Organisation	A B C D E	F G H	I J K	L M N
28. Resource Allocation	A B C D E	F G H	I J K	L M N
29. Stress/Conflict Management	A B C D E	F G H	I J K	L M N
30. Team Building	A B C D E	F G H	I J K	L M N
31. Technical	A B C D E	F G H	I J K	L M N
32. Written Communication	A B C D E	F G H	I J K	L M N

Section IV - Background Information: (Questions 33 - 46)

The purpose of this section is to describe your personal background in the skills development methods area. Refer to the previous page for exact definitions if necessary.

Please select the closest answer from the choices given for the next 5 questions.

33. I have had the following amount of time in Project Officer/Program Manager assignments:

- | | |
|----------------------------|----------------------------|
| A. Between 0 and 2 years | G. Between 12 and 14 years |
| B. Between 2 and 4 years | H. Between 14 and 16 years |
| C. Between 4 and 6 years | I. Between 16 and 18 years |
| D. Between 6 and 8 years | J. Between 18 and 20 years |
| E. Between 8 and 10 years | K. Greater than 20 years |
| F. Between 10 and 12 years | |

34. I have had the following amount of time in Observational assignments:

- | | |
|----------------------------|----------------------------|
| A. Between 0 and 2 years | G. Between 12 and 14 years |
| B. Between 2 and 4 years | H. Between 14 and 16 years |
| C. Between 4 and 6 years | I. Between 16 and 18 years |
| D. Between 6 and 8 years | J. Between 18 and 20 years |
| E. Between 8 and 10 years | K. Greater than 20 years |
| F. Between 10 and 12 years | |

35. I have had the following amount of time in General Acquisition assignments:

- | | |
|----------------------------|----------------------------|
| A. Between 0 and 2 years | G. Between 12 and 14 years |
| B. Between 2 and 4 years | H. Between 14 and 16 years |
| C. Between 4 and 6 years | I. Between 16 and 18 years |
| D. Between 6 and 8 years | J. Between 18 and 20 years |
| E. Between 8 and 10 years | K. Greater than 20 years |
| F. Between 10 and 12 years | |

36. I have had the following amount of time in Operational assignments:

- | | |
|----------------------------|----------------------------|
| A. Between 0 and 2 years | G. Between 12 and 14 years |
| B. Between 2 and 4 years | H. Between 14 and 16 years |
| C. Between 4 and 6 years | I. Between 16 and 18 years |
| D. Between 6 and 8 years | J. Between 18 and 20 years |
| E. Between 8 and 10 years | K. Greater than 20 years |
| F. Between 10 and 12 years | |

37. I have had the following amount of time in Headquarters assignments:

- | | |
|----------------------------|----------------------------|
| A. Between 0 and 2 years | G. Between 12 and 14 years |
| B. Between 2 and 4 years | H. Between 14 and 16 years |
| C. Between 4 and 6 years | I. Between 16 and 18 years |
| D. Between 6 and 8 years | J. Between 18 and 20 years |
| E. Between 8 and 10 years | K. Greater than 20 years |
| F. Between 10 and 12 years | |

38. From the list below, select your current Acquisition Management Career Development Program Certification level (prior 4 level system):

- A. Level I
- B. Level II
- C. Level III
- D. Level IV
- E. Not yet certified
- F. Unknown

Section IV - Background Information: (Continued)

Please answer the next 5 questions by selecting the "best" answer.

39. With regard to a Bachelor's Degree, I:

- A. Do not have one
- B. Have a Technical (science, engineering, or computers) degree
- C. Have a Non-Technical (other disciplines than Technical) degree
- D. Have more than one degree

40. With regard to a Graduate Degree, I:

- A. Do not have one
- B. Have one
- C. Have more than one

41. With regard to Squadron Officer's School, I:

- A. Have not completed
- B. Have completed by attending in Residence
- C. Have completed by another means

42. With regard to Intermediate Service School or equivalent, I:

- A. Have not completed
- B. Have completed by attending in Residence
- C. Have completed by another means

43. With regard to Senior Service School or equivalent, I:

- A. Have not completed
- B. Have completed by attending in Residence
- C. Have completed by another means

Please answer the next 3 questions based upon memory, examination of training records is not required.

44. With regard to General Training (Seminars, Workshops, Symposiums, or Instructional Briefings), I have completed (count each seminar, workshop, symposium, or instructional briefing as one item) approximately:

- A. 0 items
- B. Between 1 and 3 items
- C. Between 4 and 6 items
- D. Between 7 and 9 items
- E. 10 items or more

45. With regard to Short Courses (courses lasting less than 1 month intended to teach specific skills (such as SYS 100, 200, 400 or PCE specialty courses)), I have completed approximately:

- A. 0 courses
- B. Between 1 and 3 courses
- C. Between 4 and 6 courses
- D. Between 7 and 9 courses
- E. 10 courses or more

46. With regard to Long Courses (courses longer than 1 month intended to develop broad skills and concepts (such as DSMC PMC or single courses taken at a university not in pursuit of a degree)), I have completed approximately:

- A. 0 courses
- B. Between 1 and 3 courses
- C. Between 4 and 6 courses
- D. Between 7 and 9 courses
- E. 10 courses or more

Expert Comments:

Please share your personal experiences below (and on the back of this page if necessary). Your comments in this section will help clarify your previous answers, improve this survey (for future use), and greatly further the goal of this research (improved career development for program managers). Do so by briefly answering the 4 questions below.

I. How have the management skills you have used changed over time (if at all)? Also, list any skills that were "missing" from this survey.

II. How have you acquired the skills you use; do you believe all skills are "learnable"? Also, list any development methods that were "missing" from this survey.

III. What is your general opinion of the current career path of program managers?

IV. Any additional comments and/or ways to improve this survey?



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE MILITARY PERSONNEL CENTER
RANDOLPH AIR FORCE BASE TX 78150-6001

3 JUN 1991

REPLY TO
ATTN OF

DPMYOS

SUBJECT

Survey Request (Your Ltrs, 23 May 91 and 30 May 91)

TO

AFIT/XPX

1. Capt Deliso's survey is approved for use with Air Force officers contingent on the following:

a. The requested sample of 601 is too large for the basic confidence interval of 90% and an error rate of $\pm 10\%$. With an overall population of 2019, 65 completed cases is acceptable to meet this confidence interval. Anticipating a 50% response rate, 130 is an acceptable sample. Unless Capt Deliso is stratifying the sample in some way, a sample of 130 is authorized.

b. Regarding the survey instrument overall. The survey is very difficult to read because of the small print. Recommend the student use a larger print.

c. Reference item 1. Response "F". "Please give this survey to a someone else" needs work! Better instructions are required. Maybe, "Please pass this survey to someone in your office who has an AFSC identified above" would work better.

d. Reference item 2, response options. Request pay grade be changed to rank and spelled out, e.g., Second Lieutenant, etc. This provides a more professional item.

e. Reference item 3. This item appears to be asking for "Total Active Federal Commissioned Service." Change to read, "How much Total Active Federal Commissioned Service do you have?"

f. Reference instructions for items 5 - 18, paragraph two. Change to read, "Consider the challenges and activities of your current job. Using the scale below, rank the importance of the 14 management skills. Do not assess your own ..."


g. Reference items 41 - 43. In each item stem, delete the adjective "a".

2. With the changes above, a survey control number of USAF SCN 91-41 is assigned to Capt Deliso's survey and expires on 1 Oct 91.

3. The "Computer Users Support Survey" submitted on behalf of Major Maureen Casey is assigned a survey control number of USAF SCN 91-42 and expires on 1 Oct 91. The survey is fairly long and

definitely monotonous; hopefully, participants will respond in sufficient numbers to make this research worthwhile.

4. Questions regarding this action can be directed to me at DSN 487-5680/2265.



CHARLES H. HAMILTON
Chief, Personnel Survey Branch

Appendix B: Spearman Rank Correlation Example
(Siegel, 1956:202-213)

The purpose of this example is demonstrate how actual survey data was transformed into a Spearman Rank Correlation Coefficient (R_s). Note that this transformation was performed a total of 56 times (4 R_s values for each of the 14 skills).

R_s is an indicator of the degree of association between two ranked variables. In this case management level and skill importance. The variables must be at least ordinal level data (these are). The method for calculating R_s is a three step process: 1) List respondents and their corresponding group level and skill importance rating, 2) rank each column entry, and 3) using the difference between the columns, calculate R_s .

STEP 1: 10 respondents and their corresponding management levels and skills importance rankings are provided in the table below. The group level ranges from 1 (duty AFSC 2721/2724) to 3 (duty AFSC 0029). The skills importance ranking is the respondent's ranking of his/her perception of the importance of the skill of interest ranging from .25 (negligible), to .2 (limited), to .33 (useful), to .5 (significant), to 1 (indispensable).

TABLE 29

Example: Management Level and Skill's Ratings

RESPONDENT	GROUP LEVEL	SKILL IMPORTANCE RATING
A	1	.25
B	1	.33
C	1	.25
D	1	.25
E	2	.33
F	2	.50
G	2	.33
H	3	1.00
I	3	.50
J	3	1.00

STEP 2: Each column is now ranked (see table below). In the first column, Group Level, notice that there are four respondent's tied at 1. Thus the rankings had there been no ties (1, 2, 3, 4) is averaged between the four, yielding 2.5 for each. The next ranking, 2, has a three way tie and is likewise averaged (rankings 5, 6, 7) yielding 6. Finally, the third ranking, 3, also has a three way tie (8, 9, 10), yielding an average of 9. The Skill Rating column is calculated in a similar fashion. The difference between the Skill Rating and Group Level columns is calculated (d). Since we are interested in the magnitude of the differences, the term must be squared to prevent terms from canceling each other (d^2). Finally, we sum the column of squared differences (Σd^2). Now we have all the information we need to calculate R_s (step 3).

TABLE 30

Example: Ranking of Management Level and Skill's Ratings

RESPONDENT	GROUP LEVEL	SKILL RATING	d	d^2
A	2.5	2	-0.50	0.25
B	2.5	5	2.50	6.25
C	2.5	2	-0.50	0.25
D	2.5	2	-0.50	0.25
E	6	5	-1.00	1.00
F	6	7.5	1.50	2.25
G	6	5	-1.00	1.00
H	9	9.5	0.50	0.25
I	9	7.5	-1.50	2.25
J	9	9.5	0.50	0.25
				$\Sigma d^2 = 14$

STEP 3: $R_{s_{123}}$ can be calculated using equation 1 below (Siegel, 1956:203).

The general equation for R_s is:

$$R_s = \frac{\Sigma x^2 + \Sigma y^2 - \Sigma d^2}{2(\Sigma x^2 \Sigma y^2)^{1/2}} \quad (1)$$

where

Σd^2 = Sum of squares difference between variables

Σx^2 = Sum of squares difference in group level

Σy^2 = Sum of squares difference in skill rating

Thus:

$$R_{s_{123}} = \frac{73.5 + 77.5 - 14}{2\{(73.5)(77.5)\}^{1/2}} = .9076$$

This R_s value is quite high (high correlated), indicating a high degree of association between group level and skill rating.

Now that R_s is calculated, it must be converted into a t statistic to test for acceptance or rejection of a hypothesis. Once a t statistic is determined, standard t distribution tables can be used at any desired alpha (α) level of significance. To convert R_s into a t statistic (using already defined variables) we use equation 2 below (Siegel, 1956:212).

$$t = R_s \{(N-2)/(1-R_s^2)\}^{1/2} \quad (2)$$

where

N = number of respondents

Thus:

$$t = .9076\{(10-2)/(1-.9076^2)\}^{1/2} = 6.11$$

Since this t value exceeds the critical t value of 1.86 (at N-2 degrees of freedom (8), and $\alpha = .10$), we reject the null and conclude that there is a statistically significant association between group level and skill rating.

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Vita

Captain Sebastiano DeLiso was born on 27 June 1963 in Las Vegas, Nevada. He graduated from Thomas S. Wootton High School in Potomac, Maryland in 1981. He attended the University of Southern California (as a member of the Reserve Officer Training Corps), graduating with a Bachelor of Science in Electrical Engineering in May 1985. Upon graduation, he was commissioned in the USAF and served his first tour of duty at Wright-Patterson AFB, OH. He began as an Avionics Project Officer for the F-15 Aircraft System Program Office where he lead a functional team of six individuals. He managed the acquisition, development, and integration of several avionics subsystems valued in excess of \$50 million. After only two years, he was selected to be the F-15E Electronic Jammer (ALQ-135) Project Officer where he lead a 21 person functional team. He managed the development, acquisition, integration, and deployment of electronic warfare systems valued in excess of \$1 billion. He entered the School of Systems and Logistics, Air Force Institute of Technology, in May 1990.

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13. ABSTRACT (Maximum 200 words) The purpose of this study was to analyze the association between the perceived importance of management skills and management level; also to assess the most effective means of developing each of those management skills. Data collection involved a two step process. First, a literature search was conducted to compile a list of common management skills and development methods. Second, from this knowledge a survey instrument (requesting respondents to: rank skill importance, select preferred development methods, and provide qualitative comments) was created and distributed. Data analysis included three basic methodologies: 1) non-parametric statistics, 2) frequency distribution analysis, and 3) qualitative analysis. The results indicate a high degree of association between perceived skills importance and management level (11 of 14 skills were significantly (statistically) associated). Further, 13 of the 14 skills had a consensus of preferred development methods (with experience as the predominant choice). The topic of development methods requires further research. The evidence suggests that the Acquisition Professional Development Program is basically sound and could be improved with only minor changes.			
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